島嶼国気候変動政策
情報収集・確認調査

最終報告書

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1. イントロダクション

1.1. イントロダクション

三菱 UFJ モルガン・スタンレー証券は、（独）国際協力機構（以下、JICA）より「島嶼国気候変動政策情報収集・確認調査」を受託した。本調査の実施にあたっては、低炭素開発の政策面や温室効果ガス削減の実務（MRV 手法等）に精通しているコンサルタントを調査団員に配し、仕様書に基づいて調査を遂行した。

1.2. 本ファイナル・レポートの目的

本ファイナル・レポートは、本調査において実施した文献調査及び政策対話の結果を成果物としてとりまとめ、将来的な島嶼国の気候変動政策の策定・実施に資することである。

1.3. 調査業務の背景・経緯

1.3.1. 本調査業務の背景・経緯

2010 年 12 月にメキシコで開催された国連気候変動枠組み条約(UNFCCC)第 16 回締約国会合（COP16）では「カンクン合意」が採択され、第 17 回締約国会合（COP17）では同合意実施のための一連の決定が行われた。

「カンクン合意」及び COP17 の決定においては、途上国に対し、開発戦略における緩和事業や適応事業の位置づけを明確に示した低炭素開発戦略（Low Emission Development Strategy: LEDS）、途上国における適切な緩和行動(NAMA)、及び国別適応計画(NAPs)の策定を奨励することが明記された。しかしながら、これらの文書の様式・内容に定まったものはなく、各国の裁量に委ねられているのが実情である。

途上国の中でも、比較的所得水準が高く規模の大きいアジア地域等においては、LEDS 等の基礎となる国別報告書（National Communication Report: NCR）や国家気候変動計画/戦略の策定が定められているが、アフリカをはじめ、大洋州及びカリブ海地域においては、同報告書や同計画/戦略の策定に関する能力向上が課題となっている。かかる状況を踏まえ、本業務では島嶼国等を対象として、途上国の国家開発計画/戦略と整合的な LEDS、NAMA、NAPs の策定及び実施に向け、各国政府の気候変動政策担当者に必要な能力強化を目的とした基礎情報収集・確認調査を行った。

1.3.2. 本業務の目的

本業務では、気候変動に関する国際交渉の状況を踏まえて、アジア大洋州及びカリブ海地域の島嶼国等を対象に、各国における LEDS、NAMA、NAPs 策定及び実施に向けて各国政府の気候変動政策担当者等に対する必要な能力強化策を報告書に取りまとめる。また、能力強化策取りまとめにあたっては、文献調査に加えて、対象国から LEDS、NAMA、NAPs の策定及び実施に携わる担当官等を我が国に招聘し、セミナーを開催し、これらの策定及び実施を各国で行っていくため、気候変動政策担当者等に必要な能力向上策につき、情報収集・意見交換を行った。

1.3.3. 調査対象国

本調査においては、次の 23 カ国について文献調査を行い、最終的に 16 カ国（下線）の気候変動交渉官が来日し、政策対話に参加した。尚、サモア、ジャマイカ、パラオ、東ティモール、及びフィジーについては、在京大使館からの参加を得た。

- ガイアナ
- キリバス
- クック諸島
- グレナダ
- サモア
- ジャマイカ
- セントルシア
- ソロモン諸島
- ツバル
- ドミニカ共和国
- トリニダード・トバゴ
- トンガ
- ナウル
- バヌアツ
- パプア・ニューギニア
- パラオ
- バルバドス
- 東ティモール
- フィジー
- ベリーズ
- マーシャル諸島
- ミクロネシア連邦
- モルディブ

2. 文献調査

2.1. 文献調査の方法

本調査の対象 23 カ国について、その地域区分から、アジア大洋州及びカリブ海地域の二つに分け、気候や土壌等の地理的条件を踏まえた適応・緩和策の特徴を洗い出し、英語で取りまとめた。主な取りまとめ項目と、本調査対象国の地域別分類を以下に示す。

地域別調査の主な項目
● 地域的特性 ・ 地理的位置 ・ 気候
● 開発政策における緩和・適応策の主流化のポイント
● 気候変動への対応における国際社会の支援と国内の具体的な取り組み ・ 適応基金（Adaptation Fund） ・ 特別気候変動基金 ・ LDC 基金 ・ クリーン技術基金 ・ クリーン投資基金他

地域区分	対象国
アジア大洋州	キリバス、クック諸島、グレナダ、サモア、ソロモン諸島、ツバル、トンガ、ナウル、バヌアツ、パプア・ニューギニア、パラオ、バルバドス、東ティモール、フィジー、マーシャル諸島、ミクロネシア連邦、モルディブ
カリブ海地域	ガイアナ、ジャマイカ、セントルシア、ドミニカ共和国、トリニダード・トバゴ、ベリーズ

また、各国の LEDS、NAMA、NAPs 策定及び実施に関する文献分析及び関連用語の整理を行い、各国における LEDS、NAMA、NAPs の計画および実施についての現状を、以下の項目ごとに英語で取りまとめた。

国別調査の主な項目
● 開発政策における緩和・適応策の主流化のポイント
● 気候変動関連の政策
● 気候変動全般に対する具体的施策
● 持続可能な開発と緩和に関する取り組み ・ 温室効果ガスインベントリ ・ 途上国における適切な緩和行動 (NAMA)
● 適応策と脆弱性への取り組み ・ 気候変動への脆弱性 ・ 国家適応行動計画(NAPA)
● 国内の主要産業
● 国家開発戦略
● 将来的な緩和/適応策の例

地域別・国別の文献調査結果は、別途開催した「政策対話」の参考資料として、参加者に配布して活用した。尚、上表の取りまとめに際して参照した文書やウェブサイト等の一覧は、調査結果のセクション(2.2 章及び 2.3 章)に示す。

2.2. 文献調査の結果 - 地域別

2.2.1. アジア大洋州地域

SIDS in Asia and the Pacific

1. Regional Characteristic

a) Geographical

SIDS (small island developing states) are primarily concentrated in the area close to the equator surrounded by three major oceans, namely the Atlantic Ocean, the Caribbean Oceans, the Indian Ocean, and the Pacific Ocean.

- **Atlantic Ocean and Caribbean Sea**: Anguilla; Antigua and Barbuda; Aruba; the Bahamas; Barbados; Belize; British Virgin Islands; Cape Verde; Cuba; Dominica; the Dominican Republic; Grenada; Guinea-Bissau; Guyana; Haiti; Jamaica; Montserrat; Netherlands Antilles; Puerto Rico; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; São Tomé and Principe; Suriname; Trinidad and Tobago; and the U.S. Virgin Islands.
- **Pacific Ocean**: American Samoa; Commonwealth of Northern Marianas; Cook Islands; Federated States of Micronesia; Fiji; French Polynesia; Guam; Kiribati; Marshall Islands; Nauru; New Caledonia; Niue; Palau; Papua New Guinea; Samoa; Solomon Islands; Timor-Lesté; Tonga; Tuvalu; and, Vanuatu.
- **Indian Ocean**: Bahrain; Comoros; the Maldives; Mauritius; the Seychelles; and, Singapore.

SIDS in Asia and the Pacific region are characterized by extremes in physical and remoteness. They are dispersed over a large geographical area and vary in land size, population, and resources.

More than 80% of Pacific islanders live in or near coastal areas and draw from the coral reef of their livelihood. The coral reef supports approximately 25% of all marine life, including over 4,000 specifies of fish, providing valuable spawning, nursery, refuge and feeding areas for large varieties of organisms. Coral reefs also play vital roles as natural breakwaters, minimizing wave imparts during storms and cyclones.

b) Climate

The Pacific Islands are tropical in climate and experience only small fluctuations in temperature and daylight throughout the year. Typical daytime temperatures are between 24C and 31C (75F – 89F) with only a few degrees drop even in the night time.

Over a 15-year average, 28 cyclones per year buzz around the Pacific. Few of these reach the intense levels causing major damage and casualties - cyclones are upgraded to hurricane status in the south pacific and to typhoon status in the north pacific.

Additionally, models indicate rising rainfall concentration throughout much of the region, including greater rainfall during the summer monsoon. Furthermore, winter rainfall is likely to decline in

South and Southeast Asia, suggesting increased aridity from the winter monsoon. The region will be affected by an increase in global sea level of approximately 3-16 cm by 2030 and 7-50 cm by 2070 in conjunction with regional sea level variability. Rising sea levels will affect a significant number of countries in the region, with small atoll Pacific Island countries, Bangladesh, the Maldives and Viet Nam particularly hard hit. Also, other studies have indicated the potential risk of more intense tropical cyclones and changes in important modes of climate variability such as the El Niño-Southern Oscillation.

2. Mainstreaming mitigation/adaptation actions in the region

SIDS in Asia and the Pacific region's economy depends largely on tourism, fisheries, forestry and agriculture which are the main source of GHG emissions. Public sector is also an important sector of the economy.

Mainly due to its geographical characteristics, countries are particularly vulnerable to rising sea level due to climate changes. SIDS in the region ranks among the most vulnerable in the world to natural disasters. Between 1950 and 2004, extreme natural disasters, such as cyclones, droughts and tsunamis, accounted for 65% of the total economic impact from disasters on the region's economies. The table presents priority sectors in adaptation and mitigation in the region.

Natural resource management (including agriculture and rural development)
● coastal and marine resources protection and management ● integrated watershed management including sustainable forestry management and wildlife management ● building synergy between adaptation and mitigation; ● pursuing proactive measures in anticipation of climate change (e.g., improved soil and water management, diversification and intensification of food and plantation crop production, developing approaches to intensive commercial agriculture, and strengthening land use planning for production of key commercial and subsistence crops).
Water
● flood control ● drainage and sanitation ● rural and urban water supply ● integrated water management, including improved catchment management (reforestation, soil conservation, wetland protection and management, and land use management) and reducing disaster risks from flooding by regulating development on floodplains and promoting flood-proof building design.
Energy
● energy conservation and efficiency ● renewable energy deployment; and ● reduction of GHG emissions from transport, solid waste and wastewater systems, and land use.

Transport
● climate proofing of roads, ports, and airports ● reduction of GHG emissions from transport through use of clean energy vehicles

3. International Assistance and National Efforts in Combating Against Climate Change

There are growing numbers of international climate finance initiatives designed to help developing countries address the challenges of climate change. Asia and the Pacific region in general have received the most international climate finance to date, largely for mitigation activities.

The GEF Trust Fund has disbursed the most climate finance in Asia and the Pacific to date and it is predominantly focused on mitigation activities. In terms of approved funding, the GEF Trust Fund is the largest contributor to the region, second to the Clean Technology Fund under Climate Investment Fund. However, the largest amount of climate finance globally, are received and spent by China and India. Countries with severe vulnerable countries such as the small island states of the Pacific, Bangladesh, and Sri Lanka have received much less funding. Equitable allocation of climate finance resources remains a challenge for the region.

Disbursement of financing for adaptation and REDD activities represent a small proportion of the climate finance directed to the region thus far. There is an urgent need for additional financing for adaptation for the region that is home to over half of the world's poor and many small island states and least developed countries.

There are 22 SIDS located in the Asia Pacific region. Their low lying coastlines, remoteness, and vulnerability to natural disasters make them particularly exposed to climate change risk, although they contribute less than 1% of global GHG emissions. Furthermore, there are 15 least developed countries in the region, which are seriously affected by natural disasters, food insecurity and water scarcity. Climate change will aggravate existing poverty, inequality and vulnerability. Both these country groups are dependent on external funding for adaptation for their survival. So far, however, they have only received $35 million from dedicated climate funds between 2004 and 2011.

Below summarize international assistance and national efforts in combating climate change for SIDS in Asia and the Pacific through major climate finance facilities.

a) Adaptation Fund

The Adaptation Fund is a financial instrument under the UNFCCC and its Kyoto Protocol (KP) and has been established to finance concrete adaptation projects and programmes in developing country Parties to the KP, in an effort to reduce the adverse effects of climate change facing communities, countries and sectors. The Fund is financed with a share of proceeds from Clean Development Mechanism (CDM) project activities as well as through voluntary pledges of donor governments. The share of proceeds from the CDM amounts to 2% of Certified Emission Reductions (CERs) issued for a CDM project activity.

Turkmenistan, Mongolia, the Maldives and the Solomon Islands have been early beneficiaries of the Adaptation Fund, which has approved $23 million for 4 projects. However, as of November 2011, no funding has been disbursed for any of these projects. Finally, Germany disbursed $27 million for 13 adaptation projects in the region through its International Climate Initiative. The table presents a list of the projects under Adaptation Fund for SIDS in Asia and the Pacific region.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Enhancing Resilience of Coastal Communities of Samoa to Climate Change	Adaptation	Samoa	2012	8.73	0
Strengthening the Resilience of our Islands and our Communities to Climate Change (SRIC - CC)	Adaptation	Cook Islands	2012	5.38	0
Enhancing resilience of communities in Solomon Islands to the adverse effects of climate change in agriculture and food security	Adaptation	Solomon Islands	2011	5.53	0.93
Increasing climate resilience through an Integrated Water Resource Management Programme in HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo Island	Adaptation	Maldives	2011	8.99	0.43

b) Global Environmental Facility Trust Fund

The Global Environment Facility Trust Fund supports the implementation of multilateral environmental agreements, and serves as a financial mechanism of the United Nations Framework Convention on Climate Change. The GEF also administers several funds established under the UNFCCC including the Least Developed Countries Trust Fund (LDCF), the Special Climate Change Trust Fund (SCCF) and is interim secretariat for the Adaptation Fund.

The table presents a list of GEF projects funded for SIDS in Asia and the Pacific under GEF 4, GEF 5 (Climate Change Focal Area, and Strategic Priority on Adaptation). The GEF Trust Fund is replenished every 4-years started from 1994. GEF 4 covers the period 2006-2010 and GEF 5 the period 2010-14. Although GEF 4 has been closed, funding approved is still being disbursed.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
GEF 4					
Action for the Development of Marshall Islands Renewable Energies (ADMIRE)	Mitigation - general	Marshall Islands	2010	0.98	0.98
Geothermal Power and Electricity Sector Development Project	Mitigation - general	Vanuatu	2010	0.91	0
Grid Connected Solar PV Central Station Project	Mitigation - general	Kiribati	2010	1	1.8
PAS Fiji Renewable Energy Power Project (FREPP)	Mitigation – general	Fiji	2010	0.98	0.98
PNG Energy Development Project	Mitigation - general	Papua New Guinea	2010	0.91	0
Sustainable Economic Development through Renewable Energy Applications (SEDREA)	Mitigation - general	Palau	2010	0.98	0.98
GEF 5					
Sustainable Energy Program	Mitigation - general	Guyana	2012	5	0
GEF 5 Strategic Priority on Adaptation					
Coastal and Marine Resources Management in the Coral Triangle of the Pacific	Adaptation	Regional - Pacific	-	1	1
Kiribati Adaptation Program - Pilot Implementation Phase	Adaptation	Kiribati	-	2.069999	2.069999

c) Clean Technology Fund (CTF)

The Clean Technology Fund (CTF), one of two multi-donor Trust Funds within the Climate Investment Funds (CIFs), promotes scaled-up financing for demonstration, deployment and transfer of low-carbon technologies with significant potential for long-term greenhouse gas emissions savings.

Channelled through the African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, Inter-American Development Bank, and World Bank Group – implement CIF Funding projects and programs.

As of 16 April 2012, 15 investment plans have been endorsed. Among them are 12 country plans and one regional plan with funding allocations totaling US$4.35 billion. One of the two additional investment plans was endorsed (but without funding allocations) for India in November 2011. Funding of the projects and programs in these plans, with a combined request of US$1.025 billion in CTF funding, will be contingent upon availability of funds beyond what is planned for in the current pipeline. The table presents a list of the projects funded under CTF investment plans for Asia and the Pacific countries. To date, there are no SIDS countries involved.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Project Preparation Grant: Cebu Bus Rapid Transit Demonstration (WB)	Mitigation - general	Philippines	2011	1	0
Vietnam-Strengthening Sustainable Urban Transport for Ha Noi Metro Line 3 Project	Mitigation - general	Vietnam	2011	1	0
Sustainable Urban Transport for Ho Chi Minh City MRT Line 2	Mitigation - general	Vietnam	2011	1	0
Indonesia: Geothermal Clean Energy Investment Project	Mitigation - general	Indonesia	2010	125	0
Renewable Energy Accelerator Program (REAP)	Mitigation - general	Philippines	2010	20	0
Sustainable Energy Finance Program (V-SEF)	Mitigation - general	Vietnam	2010	30	0
Sustainable Energy Finance Program	Mitigation - general	Thailand	2010	30	0
Thailand's Renewable Energy Accelerator Program	Mitigation - general	Thailand	2010	40	0

d) Pilot Program For Climate Resilience (PPCR)

The Pilot Program for Climate Resilience (PPCR) is a targeted program of the Strategic Climate Fund (SCF), which is one of two funds within the Climate Investment Funds (CIF) framework.

The PPCR aims to pilot and demonstrate ways in which climate risk and resilience may be integrated into core development planning and implementation by providing incentives for scaled-up action and initiating transformational change. The PPCR has supported programs in Samoa and Papua New Guinea for a total of $26 million in the form of grants, the majority (25 million) of which was disbursed in 2011. The table presents a list of the projects funded under PPCR for SIDS in Asia and the Pacific.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Project Preparation Grant for Enhancing the Climate Resilience of Coastal Resources and Communities	Adaptation	Samoa	2011	0.4	0
Project Preparation Grant for Enhancing Climate Resilience of the West Coast Road	Adaptation	Samoa	2011	0.2	0
design of national Strategic Programs for Climate Resilience (SPCR) (phase 1 funding)	Adaptation	Papua New Guinea	2010	0.5	0.09

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
design of national Strategic Programs for Climate Resilience (SPCR) (phase 1 funding)	Adaptation	Samoa	2010	0.5	0.08
design of national Strategic Programs for Climate Resilience (SPCR) (phase 1 funding)	Adaptation	Tonga	2010	0.25	0.09

e) Forest Investment Program (FIP)

The Forest Investment Program (FIP) is a targeted program of the Strategic Climate Fund (SCF) within the Climate Investment Funds (CIF).

The FIP supports developing countries' efforts to reduce deforestation and forest degradation (REDD) and promotes sustainable forest management that leads to emission reductions and the protection of carbon reservoirs. It achieves this by providing scaled-up financing to developing countries for readiness reforms and public and private investments, identified through national REDD readiness or equivalent strategies.

The Carbon Fund Updates suggest that $89 million has been directed to REDD + activities in Asian and the Pacific countries. In the region, Indonesia has been a primary focus given its expansive tropical forests, which are under immense pressure, particularly from agricultural expansion (including for biofuels) and logging, and receives the majority of REDD+ finance as a participant in the Forest Carbon Partnership Facility, the UN-REDD program, and the Forest Investment Program (FIP) of the CIFs.

Indonesia has also established its own national Indonesia Climate Change Trust Fund, which supports REDD+ projects. Additionally, it has entered into a major bilateral arrangement with the Government of Norway to receive up to $1 billion for REDD+ activities, alongside ongoing bilateral collaborations with countries such as Germany and Australia.

Some forest rich Pacific islands –notably Papua New Guinea (PNG)—have been vocal advocates in the UNFCCC negotiations on the need for financial compensation for reducing deforestation. UNREDD is working with PNG and the Solomon Islands, as is the FCPF. Germany's International Climate Initiative has also supported a regional capacity building program on REDD and disbursed some $45 million to Asia Pacific to date. Australia's International Forest Carbon Initiative has disbursed $26 million.

The table presents a list of the projects funded under FIP program in Asia and the Pacific. To date, there are no SIDS countries involved.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Preparation Grant request for Investment Plan	Mitigation - REDD	Indonesia	2011	0.23	0.1
Investment Plan Preparation Grant	Mitigation - REDD	Lao PDR	2011	0.23	0
Scaling up PSFM _PFA/WPFA	Mitigation - REDD	Lao PDR	2011	0.5	0
Scaling-up Participatory Sustainable Forest Management (Scaling-up PSFM)	Mitigation - REDD	Lao PDR	2011	0.75	0
Smallholders Forestry Project	Mitigation - REDD	Lao PDR	2011	0	0

f) Scaling-Up Renewable Energy Program in Low Income Countries (SREP)

The Scaling-Up Renewable Energy Program in Low Income Countries (SREP) is a targeted program of the Strategic Climate Fund (SCF), which is one of two funds within the Climate Investment Funds (CIF) framework.

The SREP was designed to demonstrate the economic, social and environmental viability of low carbon development pathways in the energy sector in low-income countries. It aims to help low-income countries use new economic opportunities to increase energy access through renewable energy use. Nepal and the Maldives are also pilot countries in the Scaling Renewable Energy Program of the CIF, and received initial planning preparation grants of $370,000 and $310,000, respectively.

The table presents a list of the projects funded under SREP program in Asia and the Pacific. Only one SIDS in the region, Maldives, is part of the program to date.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Investment Plan Preparation Grant	Mitigation - general	Maldives	2011	0.31	0.1
Investment Plan Preparation Grant & Implementation Grant	Mitigation - general	Nepal	2011	40.37	0.16
Scaling up access to electricity in Rural Nepal	Mitigation - general	Nepal	2011	0.37	0
Scaling up first hydro promotion Nepal	Mitigation - general	Nepal	2011	0.37	0
Scaling up access to electricity in Rural Nepal	Mitigation - general	Nepal	2011	0.37	0
Sustainable Household Energy Solutions	Mitigation - general	Nepal	2011	0.2	0

g) International Forest Carbon Initiative (IFCI)

Australia's International Forest Carbon Initiative supports global efforts to establish a REDD+ mechanism under the UNFCCC. Jointly administered by the Australian Department of Climate Change and Energy Efficiency and AusAID, the initiative enables Australia to work closely with developing countries to find practical ways to reduce forest emissions. The Australian Government does not intend to set up a new fund or governance structure through IFCI, but will work through established channels of bilateral dialogue and cooperation at the international level.

In June 2010, Australia announced it would contribute A$599 million (US$512.95 million) to fast-start financing for climate change, to be delivered using existing partnerships, mechanisms and relationships. This fast start package includes A$146 million (US$125.03 million) to the IFCI to assist developing countries with REDD+ activities.

The table presents a list of the projects funded under IFCI in Asia and the Pacific. Only one SIDS in the region, Papua New Guinea, is part of the program to date.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Asia Pacific Forestry Skills and Capacity Building Program	Mitigation - REDD	Global	n/a	14.5	6.6
Bilateral package of support on forests and climate	Mitigation - REDD	Indonesia	n/a	16.6	6.5
CIFOR (Center for International Forest Research)	Mitigation - REDD	Global	n/a	2.8	2.3

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Carbon accounting data purchase	Mitigation - REDD	Global	n/a	7.5	3
Forest Carbon Partnership Facility	Mitigation - REDD	Global	n/a	30	0
Forest Investment Program	Mitigation - REDD	Global	n/a	30	0
Kalimantan Forests and Climate Partnership (FFCP)	Mitigation - REDD	Indonesia	n/a	43.2	12.2
NGO development grants	Mitigation - REDD	Global	n/a	1.3	0.7
Package of bilateral support	Mitigation - REDD	Papua New Guinea	n/a	3.04	0.4
Satellite Data Receiving Station	Mitigation - REDD	Asia Pacific	n/a	9	0
Sumatra Forest Carbon Partnership	Mitigation - REDD	Indonesia	n/a	27.6	0
World Bank FCPF Readiness Mechanism	Mitigation - REDD	Global	n/a	0	0
World Bank Forest Investment Program (FIP)	Mitigation - REDD	Global	n/a	0	0

h) Programs/project funded by bilateral donors

- Fast-start finance provided by the Japanese Government

In December 2009, Japan announced the assistance of approximately USD 15 billion including public and private financing developing countries in the world, of which public finance comprises approximately USD 11 billion, for developing countries up to 2012 to address climate change, announced as the “Hatoyama Initiative”.

This Fast-Start Finance aims to assist developing countries, especially those making efforts to reduce GHG emissions as well as those which are vulnerable to the negative impacts of climate change, taking into account the developments in the international negotiations and the state of Japan’s reconstruction. The table presents a list of fast-start finance provided to SIDS in the region by the Japanese government up to 2012.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Project for Promotion of Regional Initiative on Solid Waste Management	Mitigation	Pacific Region	2011	1.22	n/a
Strengthening Community Disaster Risk Management Project in the Pacific Region	Adaptation	Fiji	2010	0.45	n/a

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Project for Clean Energy Promotion in Male	Mitigation	Maldives	2010	8.7	n/a
The survey for gas conversion and efficiency in thermal power plant	Mitigation	Papua New Guinea	2010	0.46	n/a
Programme for Improving the Weather Forecasting System and Meteorological Warning Facilities	Adaptation	Samoa	2010	6.48	n/a
The training for integrated water resources and environment management policy	Adaptation	Singapore	2010	0.02	n/a
Project for the Improvement of Radio Broadcasting Network for Administration of Disaster Prevention	Adaptation	Solomon Islands	2011	4.38	n/a

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Project for Introduction of Clean Energy by Solar Electricity Generation System	Mitigation	Timor-Leste	2010	4.35	n/a
Project for Introduction of Clean Energy by Solar Electricity Generation System	Mitigation	Tonga	2010	5.13	n/a
Project on Pilot Gravel Beach Nourishment against Coastal Disaster on Fongafale Island, Tuvalu	Adaptation	Tuvalu	2012	0.44	n/a

- Pacific Adaptation to Climate Change (PACC) Project

The Australian Government (AusAID) and the United States of America (USAID) are one of the bilateral donors active in assisting SIDs countries. PACC project, under Secretariat of the Pacific Regional Environment Programme (SPREP) is funded by the Global Environment Facility (GEF). Further funding has been provided by AusAID and USAID for additional activities, with support from UNITAR through the C3D+ programme for developing adaptation measures and capacity building to effectively respond to climate change. The implementing agency of the project is

United Nations Development Programme (UNDP).

The PACC project covers 14 Pacific islands countries and territories to help develop three key development areas that build resilience to climate change in Pacific communities.

Under the project, Fiji, Palau, Papua New Guinea and the Solomon Islands will focus on food production and food security. The Cook Islands, Federated States of Micronesia, Samoa, Tokelau and Vanuatu are developing Coastal Management capacity and Nauru, Niue, Republic of Marshall Islands, Tonga and Tuvalu are looking to strengthen their water resource management.

- U.S. Agency for International Development (USAID)

A large portion of U.S. climate support is provided to developing countries through multi-regional, regional, and bilateral programs, principally supported by USAID. This assistance is targeted to help the most vulnerable countries adapt to climate impacts and to partner with countries with significant opportunities to mitigate their emissions. In Fiscal 2011, USAID provided bilateral and regional assistance programs to 36 countries in the region including 15 SIDS.

In Maldives, US$ 3 million was invested to support the Program to Enhance Climate Resiliency and Water Security which will provide assistance to Maldives to become “climate resilient islands.”

In the region, some regional programs benefiting a number of countries were extended in the region in the area of increasing adaptation and resilience to the negative impacts of climate change (US$7.5 million), improvement of sustainable forest management (US$1 million), and promotion of clean energy (US$1 million).

- Maldives Climate Change Trust Fund

In 2010, the Government of Maldives established Climate Change Trust Fund with EUR 6.5 million (approximately $8.8 million) contribution by the European Union (EU) to carry out their priority projects relating to climate change adaptation and mitigation. The fund has been administered by the World Bank for over three and a half years period.

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This summary was prepared based on the data/information available as of June 2012.

2.2.2. カリブ海地域

SIDS in the Caribbean

1. Regional Characteristic

a) Geographical

SIDS (small island developing states) are primarily concentrated in the area close to the equator surrounded by three major oceans, namely the Atlantic Ocean, the Caribbean Oceans, the Indian Ocean, and the Pacific Ocean.

- **Atlantic Ocean and Caribbean Sea**: Anguilla; Antigua and Barbuda; Aruba; the Bahamas; Barbados; Belize; British Virgin Islands; Cape Verde; Cuba; Dominica; the Dominican Republic; Grenada; Guinea-Bissau; Guyana; Haiti; Jamaica; Montserrat; Netherlands Antilles; Puerto Rico; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; São Tomé and Principe; Suriname; Trinidad and Tobago; and the U.S. Virgin Islands.
- **Pacific Ocean**: American Samoa; Commonwealth of Northern Marianas; Cook Islands; Federated States of Micronesia; Fiji; French Polynesia; Guam; Kiribati; Marshall Islands; Nauru; New Caledonia; Niue; Palau; Papua New Guinea; Samoa; Solomon Islands; Timor-Lesté; Tonga; Tuvalu; and, Vanuatu.
- **Indian Ocean**: Bahrain; Comoros; the Maldives; Mauritius; the Seychelles; and, Singapore.

The Caribbean countries are in the tropics, generally between latitudes 11 and 18 degrees north, from Suriname in the south to the Bahamas in the north. The region generally consists of island states, the exceptions being Belize in Central America, and Guyana and Suriname, situated on the South American continent. The topography is generally rugged and mountainous with small areas of flat land in coastal areas. Several islands are volcanic in origin, while others are comprised primarily of coral.

b) Climate

The Caribbean region climate is characterized by dry winters and wet summers with the dominant influence of the North Atlantic subtropical high (NAH). During winter, the NAH lies further south with strong easterly trade winds modulating the region's climate and weather which is then usually at its driest with reduced atmospheric humidity.

Together with a strong inversion, a cool ocean, and reduced atmospheric humidity, the region is generally at its driest during the Northern Hemisphere winter. With the onset of the Northern Hemisphere spring, the NAH moves northwards, trade wind intensity decreases, and the region then comes under the influence of the equatorial trough.

2. Mainstreaming mitigation/adaptation actions in the region

Economic activities in SIDS in the Caribbean primarily involve direct exploitation of natural resources such as coastal and marine ecosystems, forests, agricultural land, and mineral

resources. Tourism is the major and most rapidly growing industry across the region. Also, mining is an important sector in some Caribbean countries, especially in Guyana, Jamaica, and Trinidad and Tobago.

Nevertheless, agriculture remains as the most climate-sensitive economic sector in the region, and rural population will have the greatest exposure to the effects of climate change. It is critical to develop strategies for promoting sustainable agriculture in the region. The table presents priority sectors in adaptation and mitigation in the region.

Agriculture
● improve fertilizer use and better methods of application ● conservation practices on arable lands ● carbon capture activities in well-managed pastures in grassland areas or deforested lands ● reduce extensive soil erosion, acidification, loss of organic matter, and compaction ● bioenergy production on agricultural and cattle farms
Water
● Sustainable coastal management and fisheries ● rural and urban water supply
Energy
● energy conservation and efficiency ● renewable energy deployment; and ● biofuel
Forest
● forest management practice for timber production ● recovery of degraded forestlands and protect existing forest ● minimize impact on forest fires and diseases
Transport
● reduce/avoid travel needs through better integration of land use, transport-planning policies, and transport demand management measures ● shift from private vehicles to mass transit (BRT or rail) and/or to non-motorized transportation ● improvement in cargo management and logistics

3. International Assistance and National Efforts in Combating Against Climate Change

The small island developing states of the Caribbean are particularly impacted by climate change, which will disrupt their natural resource base, and core economic activities including tourism and agriculture. Tackling such problems demands considerable resources, and access to climate finance is crucial for the region.

Latin America and the Caribbean together currently receive a relatively small amount of international finance from bilateral and multilateral climate finance initiatives. A total of $930

million has been approved within the region between 2004 and October 2011 through dedicated climate funds.

Five countries within the region receive the majority of climate finance: Brazil ($94 million), Mexico ($54 million), Peru ($32 million), Colombia ($25 million), and Chile ($ 18 million). In Caribbean countries, adaptation programs are now getting underway; however to date only $2.4 million appears to have been disbursed to climate change projects in small island developing countries.

Below summarize international assistance and national efforts in combating climate change for SIDS in the Caribbean through major climate finance facilities.

a) Adaptation Fund

The Adaptation Fund is a financial instrument under the UNFCCC and its Kyoto Protocol (KP) and has been established to finance concrete adaptation projects and programmes in developing country Parties to the KP, in an effort to reduce the adverse effects of climate change facing communities, countries and sectors. The Fund is financed with a share of proceeds from Clean Development Mechanism (CDM) project activities as well as through voluntary pledges of donor governments. The share of proceeds from the CDM amounts to 2% of Certified Emission Reductions (CERs) issued for a CDM project activity.

In the region, Jamaica is the only country with ongoing project finance through Adaptation Fund. The table presents a list of the projects under Adaptation Fund for SIDS in the Caribbean region.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Enhancing the Resilience of the Agriculture Sector and Coastal Areas to Protect Livelihoods and Improve Food Security	Adaptation	Jamaica	2011	0.03	0.03

b) Global Environmental Facility Trust Fund

The Global Environment Facility Trust Fund supports the implementation of multilateral environmental agreements, and serves as a financial mechanism of the United Nations Framework Convention on Climate Change. The GEF also administers several funds established under the UNFCCC including the Least Developed Countries Trust Fund (LDCF), the Special Climate Change Trust Fund (SCCF) and is interim secretariat for the Adaptation Fund.

The table presents a list of GEF projects funded for SIDS in the Caribbean under GEF 4, GEF 5 (Climate Change Focal Area). The GEF Trust Fund is replenished every 4-years started from 1994. GEF 4 covers the period 2006-2010 and GEF 5 the period 2010-14. Although GEF 4 has been closed, funding approved is still being disbursed.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
GEF 4					
Promoting Sustainable Energy in the Bahamas	Mitigation - general	Bahamas	2010	1	1
Sustainable Energy Framework for Barbados	Mitigation - general	Barbados	2010	1	1
Emergency program for solar power generation and lighting for Haiti, as a consequence of the Earthquake in Port au Prince	Mitigation - general	Haiti	2010	1	1
Small Scale Hydro Power Development in Haiti	Mitigation - general	Haiti	2010	0.98	0.98
LGGE Promoting Energy Efficiency and Renewable Energy in Buildings in Jamaica	Mitigation - general	Jamaica	2010	2.36	0
GEF 5					
Stimulating Industrial Competitiveness Through Biomass-based, Grid-connected Electricity Generation	Mitigation - general	Dominican Republic	2012	1.3	0

Further, the most recent GEF Council approved a Work Program of 84 projects and two programmatic approaches amounting to US$667.26 million in GEF project grants,

Among specific projects, the GEF will fund a regional project involving Antigua and Barbuda, Barbados, Cuba, the Dominican Republic, Grenada, Jamaica, St. Kitts and Nevis, St Lucia, and St. Vincent and Grenadines, for the implementation of Integrated Land, Water, and Wastewater Management in Caribbean SIDS with a US$20 million grant. The project aims to accelerate the achievement of global targets on access to safe and reliable water supplies and improved sanitation, and address adaptation to climate change.

c) Pilot Program For Climate Resilience (PPCR)

The Pilot Program for Climate Resilience (PPCR) is a targeted program of the Strategic Climate Fund (SCF), which is one of two funds within the Climate Investment Funds (CIF) framework.

The PPCR aims to pilot and demonstrate ways in which climate risk and resilience may be integrated into core development planning and implementation by providing incentives for scaled-up action and initiating transformational change.

Over the last year the Pilot Program for Climate Resilience (PPCR) of the CIFs has been increasingly active in the region. The PPCR is designed to provide programmatic finance to strengthen resilience; for Bolivia $86 million was recently approved, using a national resilience plan as the basis for programming. The PPCR is also supporting a regional program in the Caribbean based on pilots in Dominica, Jamaica, Haiti, Grenada, St Lucia, St Vincente, and the Grenadines with $33 million of approved funding. Although the majority of PPCR projects are supported through grants, a large volume of this financing will be provided in the form of loans. The table presents a list of the projects funded under PPCR for SIDS in the Caribbean.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
design of national Strategic Programs for Climate Resilience (SPCR) (phase 1 funding)	Adaptation	Dominica	2011	0.31	0.07
Building National Climate Resilience, One Person, One Household, One Enterprise, One Community, One Sector at a Time (project preparation grant)	Adaptation	St Lucia	2011	0.75	0
Disaster vulnerability and climate risk reduction project	Adaptation	Grenada	2011	16.41	0
Disaster Vulnerability and Climate Risk Reduction Project	Adaptation	St Vincent & Grenadine	2011	10	0
design of national Strategic Programs for Climate Resilience (SPCR) (phase 1 funding)	Adaptation	Grenada	2010	0.27	0.27
design of national Strategic Programs for Climate Resilience (SPCR) (phase 1 funding)	Adaptation	Jamaica	2010	0.51	0.38
design of national Strategic Programs for Climate Resilience (SPCR) (phase 1 funding)	Adaptation	St Lucia	2010	0.32	0.2
design of national Strategic Programs for Climate Resilience (SPCR) (phase 1 funding)	Adaptation	St Vincent & Grenadine	2010	1.414	0.19

Furthermore, the PPCR committee endorsed $10 million for the Caribbean region to enhance hydromet and climate information services, implement adaptation measures in key sectors, and synchronize the strategic programs for climate resilience of six PPCR pilot countries: Dominica, Grenada, Haiti, Jamaica, St. Lucia and St. Vincent, and the Grenadines and $10.6 million for the Pacific region to strengthen integration and implementation of climate change adaptation and disaster risk reduction measures in 14 Pacific island countries.

Three national strategic programs for climate resilience were also endorsed under the PPCR: $14 million for the Kingdom of Tonga to facilitate capacity building, establish national climate financing and small grants schemes, and improve resilience of coastal ecosystems and critical infrastructure; $16 million for Dominica to develop climate financing schemes and boost resilience in agriculture and community welfare.

d) Scaling-Up Renewable Energy Program in Low Income Countries (SREP)

The Scaling-Up Renewable Energy Program in Low Income Countries (SREP) is a targeted program of the Strategic Climate Fund (SCF), which is one of two funds within the Climate Investment Funds (CIF) framework.

The SREP was designed to demonstrate the economic, social and environmental viability of low carbon development pathways in the energy sector in low-income countries. It aims to help low-income countries use new economic opportunities to increase energy access through renewable energy use. Currently, there is no ongoing SREP program in the Caribbean, however, there are five programs exist in neighbouring Honduras, as presented in the table.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Grid connected RE Development Support (project preparation grant)	Mitigation - general	Honduras	2011	0	0
Grid connected RE Development Support (ADERC)-generation (project preparation grant)	Mitigation - general	Honduras	2011	0.4	0
Investment Plan Implementation Grant	Mitigation - general	Honduras	2011	30	0
Investment Plan Preparation Grant	Mitigation - general	Honduras	2011	0.37	0
Sustainable rural energisation (project preparation grant)	Mitigation - general	Honduras	2011	0.3	0

e) Sustainable Energy and Climate Change Initiative (SECCI)

The Inter-American Development Bank (IDB) is a key player in the region, both as an implementing agency for Clean Investment Fund projects and in its own right. In 2006,

Sustainable Energy and Climate Change Initiative (SECCI) was established by IDB with funding from international donors such as Spain, Germany, Italy, Finland, United Kingdom and Japan). The purpose of the funds is to finance activities under SECCI, aiming at expanding investment in renewable energy and energy efficiency technologies, increasing access to international carbon finance, and the mainstreaming of adaptation to climate change into the policies and programs across sectors in Latin America and the Caribbean.

f) Programs/project funded by bilateral donors

- Fast-start finance provided by the Japanese Government

In December 2009, Japan announced the assistance of approximately USD 15 billion including public and private financing developing countries in the world, of which public finance comprises approximately USD 11 billion, for developing countries up to 2012 to address climate change, announced as the "Hatoyama Initiative".

This Fast-Start Finance aims to assist developing countries, especially those making efforts to reduce GHG emissions as well as those which are vulnerable to the negative impacts of climate change, taking into account the developments in the international negotiations and the state of Japan's reconstruction. The table presents a list of fast-start finance provided to SIDS in the region by the Japanese government up to 2012.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
The Project for the Rehabilitation of the East Demerara Water Conservancy	Adaptation	Guyana	2011	2.21	n/a
Legal System and Regional Coordination on Solid Waste	Mitigation	Saint Lucia	2010	0.01	n/a
The Project for irrigation system for promotion of Cotton production	Adaptation	St. Christopher and Nevis	2010	0.09	n/a

- International Climate Initiative by the Government of Germany

The International Climate Initiative (ICI) funded by the government of Germany finances climate projects in developing and newly industrialised countries, as well as countries in transition economies. The ICI focuses on promoting a climate-friendly economy, measures for climate change adaptation and for the preservation or sustainable use of carbon reservoirs/Reducing Emissions from Deforestation and Forest Degradation (REDD).

ICI plays increasingly important roles in the region. The table presents major activities supported by ICI in the region.

Project	Focus	Country	Start Year	Approved	Disbursed
				US$ million	
Ecosystem adaptation for subsistence farmers, smallholders and coffee farmers in communities in Central America	Adaptation	Costa Rica, Guatemala, Honduras	2012	3.93	n/a
Supporting Costa Rica's climate-neutral strategy (Costa Rica)	Mitigation - general	Costa Rica	2012	4.45	n/a
Climate risk adaptation and insurance in the Caribbean (Jamaica, St. Lucia, Grenada, Belize and Guyana)	Adaptation	Jamaica, St. Lucia, Grenada, Belize and Guyana	2012	2.58	n/a
Tropical Forest Conservation in the Guiana Shield Ecoregion	Mitigation - REDD	Brazil, Guyana, Suriname	2009	3.375	n/a
Bioenergy in the Caribbean	Mitigation - general	St. Vincent and the Grenadines	2008	0.409	n/a

- U.S. Agency for International Development (USAID)

A large portion of U.S. climate support is provided to developing countries through multi-regional, regional, and bilateral programs, principally supported by USAID. This assistance is targeted to help the most vulnerable countries adapt to climate impacts and to partner with countries with significant opportunities to mitigate their emissions. In Fiscal 2011, USAID provided bilateral and regional assistance programs to 26 countries in the region including 12 SIDS. Examples of the bilateral programs newly approved in 2011 are:

In Barbados, US$ 2.3 million was invested for improvement of its strategies to adapt climate change. The program also supports activities in water management for flood prevention along the west coast of the island.

In Dominican Republic, US$1.5 million was invested for a program to identify climate change impact on coastal and agricultural resources and associated livelihoods. Also US$1.2 million was invested in the USAID-Dominican Republic Sustainable Tourism Alliance to promote climate adaptive measure for tourism sector. Furthermore, more than US$200,000 is provided to strengthen adaptation to climate change impacts by forming water conservation coalitions in major river watersheds.

In Haiti, US$1.8 million to initiate feasibility studies for developing wind and solar energy for industrial park. Also, US$1 million was invested on sustainable agricultural development to decrease the risk of flooding in the Port-au-Prince and St. Marc development corridors.

Furthermore, US$500,000 was invested to integrate climate change considerations into agricultural sector to identify crops that are more resilient to climate impact.

In Jamaica, US$3.0 million was invested to improve resilience to climate change impacts on the agricultural sector.

USAID also extended some regional programs benefiting a number of countries including SIDS in the region such as through Amazon Forest Sector Initiative (US$4.0 million), Reducing Risks to Human and Natural Assets Program (US$1.7 million), Support to the Caribbean Institute of Meteorology and Hydrology (US$1.3 million), Adaptation Assistance to Caribbean nations (US$ 1.0 million), etc.

- Guyana REDD Investment Fund

Guyana has been active in efforts to pilot new approaches to REDD+. They have established their own national fund for REDD with support from the government of Norway.

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This summary was prepared based on the data/information available as of June 2012.

2.3. 文献調査の結果 - 国別

2.3.1. ガイアナ

Guyana

1. Mainstreaming adaptation / mitigation actions in the national development strategy

While Guyana is a net sink country for greenhouse gases, it is very vulnerable to the impacts of climate change. These impacts have been predicted as having the largest effect on Guyana's water supply, its energy sector, and its agricultural sector.

Adapting to the impacts of climate change will require substantial financial and technical assistance. The overall goals of adaptation are to promote sustainable development and to reduce vulnerability. Sustainable development will entail ensuring economic development of all administrative regions, protection of the environment and equitable distribution of the wealth of the nation. Reduction of vulnerability will require minimizing of the risks of the impacts, reducing economic losses and alleviating hardships while building the institutional response mechanisms for detecting and warning of the signals of the impacts and for responding to emergencies and other activities required to address vulnerable ecosystems. There is also a need for strengthening governmental capacity as well as capacity of local communities.

2. Summary on climate change related issues in the country

- **Climate change policy**

Guyana ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 29 August 1994 and the Kyoto Protocol on 5 August 2003, and submitted their first National Communications Report on 16 May 2002. The National Climate Committee (NCC), comprising several governmental agencies, the University of Guyana (UG) and the Guyana Manufacturers Association (GMA), established a National Task Force that prepared the Initial National Communication and the Action Plan under the guidance of an international consultancy. Several Workshops and working group and Task Force meetings were held in order to train local resource personnel, and to prepare the several chapters of the two reports. The base year for the Initial National Communication is 1994.

The Guyanese policy framework on Climate Change is not in place at the national nor at the sectoral levels. The National Development Strategy (NDS) should be supplemented with related policies regarding implementation of the Convention in Guyana. The policy and legal foundations should provide guidance on the administrative framework, which will emerge.

As outlined in the Guyana Climate Change Action Plan's policy section, the objective is to create the legislative environment to ensure that climate programmes are directed from:

- Specific economic and technological opportunities and restrictions,
- Ideas on governance in relation to environmental policy as well as relationships between the

State, the market and civil society
- Macro-socio economic policies such as the NDS

Guyana's EPA ACT does not detail adequately, policy with regards to global warming and anthropogenic climate change. Particularly, it needs to include adequate policy direction for the commitments that Guyana must address under the UNFCCC and the direct beneficial actions under the Kyoto Protocol. The National Environmental Action Plan (NEAP) is also very short on policy direction with regards to climate change, vulnerabilities and responses to the adverse effects of climate change and how to deal with opportunities, which will arise from the negotiation process.

There is also no policy direction for dealing with conflicts arising from implementation of the various Conventions and Protocol relating to the environment in general and the atmosphere in particular. These shortcomings must be addressed through legislation in order to promote coordinated and effective implementation of climate change programmes.

- **National efforts / measures against climate change**

Guyana's efforts to respond to the commitments under the conventions will necessarily have to be in the form of adaptation and mitigation measures. However, these will not be achieved unless public awareness, capacity building, information sharing, and the right policy, legislation and financial measures are put in place.

The National Development Strategy of Guyana was tabled in Parliament in July, 2000. It was a policy framework for the period 2001 to 2010 and had the following objectives:
- attain the highest rates of economic growth that are possible;
- eliminate poverty in Guyana;
- achieve geographical unity;
- attain an equitable geographical distribution of economic activity; and
- diversify the economy.

In achieving these objectives, the Strategy emphasized the important role of environmental conservation as a prime consideration. The principles of precautionary actions and generational responsibilities were seen as environmental philosophies on which socio-economic development would proceed. While the Strategy made no direct mention of global warming, climate change and impacts in Guyana, the general theme of environmental problems, especially in the coastal zone, addressed some of the problems associated with global warming.

It is therefore necessary for the Climate Change Action Plan to be seen as an important supplement to the Strategy and for socio-economic development programmes to take into consideration the activities which have been included in the Action Plan.

Office of Climate Change in the Office of the President of Guyana is designated national authority for CDM. Guyana has one bagasse cogeneration CDM project registered. The project has funded by the Community Development Carbon Fund of the World Bank.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

The Convention requires Parties to make periodic reports on national inventory of greenhouse gases. Guyana utilized the IPCC Revised 1996 Guidelines for National Greenhouse Gas Inventories and considered carbon dioxide, methane, nitrous oxide, non-methane volatile organic compounds, carbon monoxide and nitrogen oxides in its inventory. 1994 was taken as the base year for Guyana.

The GHG Inventory was done on a sector basis for Energy, Industrial Processes, Agriculture, Land Use Change and Forestry and Waste. The Solvents sector was not considered since the IPCC methodology for this sector was not yet available.

Table 1: CO2 emissions and removals (Gg) by sectors for Guyana, 1994

Greenhouse Gas Source and Sink Categories	C02/Emissions	C02/Removals
Energy	1,446	0
Industrial Processes	0	0
Agriculture	0	0
Land- Use Change and Forestry	(2530.88)	-26, 664.47*
Waste	N.E.	0
Total National Emissions and Removals	1446	-26, 664.47*
Memo Items		
International Bunkers	28	0
C02 Emissions from Biomass	1200	0

Table 2: Non- CO2 emissions (Gg) by sectors, 1994.

	Emissions (Gg)				
Greenhouse Gas Source and Sink Categories	CH4	N2O	NOx	CO	NMVOC
Energy	0.72	0.06	10.66	44.51	6.27
Industrial Processes	0	0	0	0	16.24
Agriculture	40.95	1.16	4.04	67.21	0
Land- Use Change and Forestry	7.77	0.05	1.93	95.27	0
Waste	1.20	0.05	0	0	0
Total National Emissions	50.64	1.32	16.63	207.73	22.51
Memo Items					
International Bunkers	0	0			0

SUMMARY AND CONCLUSIONS

Based on the inventory of GHG for Guyana for the reference year 1994, and the years preceding and following, it is evident that insofar as CO2 Emissions and Removals are concerned, Guyana can be considered as a Net Sink Country, namely removals (-26,664.47 Gg) greatly exceed emissions (1,446 Gg) in 1994, resulting with a removal balance of (-25, 218 Gg) for CO_2.

Furthermore, CO_2 removals, which are largely due to absorption by its vast tracts of luxuriant tropical forests, are calculated based on the relatively small (13.8 % in 1998) anthropogenically-impacted fraction of the total forest area (16,450,000 ha). Guyana can increase its CO_2 sink capacity, through consideration of its total forest area, if it can justify the fact that its policies on forest conservation and preservation, whether or not with carbon sequestration in view, are an anthropogenic act.

As shown in the inventory, CO_2 emissions derived mainly from fuel combustion activities in the Energy sector. Any mitigation effort by Guyana can therefore focus on the activities in this sector. Non-CO_2 emissions in Guyana are relatively small. CH_4 emissions for instance derive mainly from rice cultivation and enteric fermentation in animals and manure in the Agriculture sector (40.95 Gg in 1994).

CO, the only other non-CO_2 gas of note is emitted by the Energy (45 Gg), Land Use Change and Forestry (68 Gg) and the Agriculture (95 Gg) sectors in 1994. Guyana's mitigation efforts can therefore be directed at the activities in these sectors.

The national inventory was calculated using rough estimations due to the lack of adequate activity data, and applying indirect default emission factors. Guyana needs to develop the capacity to prepare emission factors for local conditions so that uncertainties in future inventories may be reduced.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Guyana has not submitted its NAMA plan.

- **Mitigation Options**

Mitigation analysis involves the development of programs related to sustainable development in the context of Climate Change and to the development of methodologies for assessing mitigation measures and of policy options for implementing adaptation/mitigation alternatives that shall allow Guyana to abate the increase in GHG emissions and to enhance their removal by sinks.

As was seen in the GHG Inventory section above, the major economic sectors that contribute to GHG emissions in Guyana are the Energy sector, mainly in CO2 emissions through energy use and transportation, and the Agriculture and Waste sectors, which contribute mainly to CH4 emissions. As for GHG removals; the Forestry sector is the major sink for CO2. Accordingly, Guyana should focus its Greenhouse Gas Mitigation (GHGM) efforts on these sectors. However, these mitigation efforts would call for resources, both technical and financial, that Guyana may not have. There

would therefore be the need to actively solicit and pursue international funding agencies such as the Global Environment Facility and the World Bank.

The following projects may be identified as possible avenues to help Guyana reach its objectives insofar as GHGM is concerned.

(1) The major contributor to GHG emissions in Guyana is the energy sector. In 1994, this sector emitted 1446 Gg of CO_2 where the energy industries sub-sector accounted for 602 Gg or 42% of emissions.

In the short term then, Guyana should actively pursue measures aimed at retrofitting its existing power plants so as to reduce CO_2 emissions and trace gases from the energy industries sector.

In the medium and long term, the development of alternative non-fossil and renewable energy sources may also be worthwhile. With its abundance of rivers and natural waterfalls Guyana has huge potentials for hydropower generation. Unfortunately, most of the potentially viable sites, such as at Moco-Moco, Tumatumari and Amaila, are located in the interior far from the coastal markets. If this sector is to be further developed projects related to transmission losses reduction or the development of new hydropower schemes closer to the Coastal Region may have to be targeted. Alternatively, projects related to the exploitation and use of other sources of non-fossil renewable energy, such as solar power and wind energy, costs permitting, in the Coastal Region may be evaluated.

(2) Another major GHG in Guyana is CH_4 emissions from rice paddies. Guyana is an important producer of rice and it is one of the major contributors to GDP. In 1994, CH_4 emissions from rice paddies amounted to 22.33 Gg. Guyana may therefore choose to mitigate CH_4 emissions from its rice paddies by looking at hybrids or upland varieties that emit less CH_4. However, a pilot research project has to be undertaken to ensure costs are not inflated and more importantly, quantity and quality of yields are not compromised.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

Guyana, being a relatively large country with both a Tropical Coastal Marine Environment where most of the population and economic activity are located and an interior Continental Tropical/Equatorial Environment would be most vulnerable to climate change and impacts such as sea level rise, especially in the coastal zone, and in the water resources, agriculture, forestry, energy and health sectors.

It is evident that if anthropogenic climate change were to occur in the manner that Atmosphere-Ocean General Circulation Model (AO-GCM)'s are predicting, several key sectors of the Guyanese economy, including agriculture and forestry, can be adversely impacted. In the forestry sector climate change would influence the distribution of forest species, with savannah replacing more valuable forest stocks in the interior. This change in forest stocks would

furthermore compromise the ability of Guyanese forests to act as a removal sink for excess atmospheric CO2. In agriculture, the yields of sugarcane and rice, the two most economic crops, risk losses under the warmer and, most likely drier, climate of the future.

Guyana's greatest vulnerability to climate change however, is the risk of flooding and inundation deriving from sea level rise in the coastal zone. Most of Guyana's population and economic activities are concentrated in this narrow, fragile, and currently stressed zone. The area is already, for the most part, below the high tide water level. An increase in sea level of about 60 cm then, as projected by AO-GCMs, would further exacerbate the vulnerability of this already fragile zone.

Policy decisions, backed by detailed studies into the response mechanisms required to adapt to the adverse effects of climate change, will be required. These decisions ought to address the direction in which coastal zone development will proceed in the future.

- **Summary of National Adaptation Programme of Action (NAPA)**

Guyana has not submitted its NAPA.

- **Adaptation Options**

Adaptation to climate change in Guyana will to a large degree depend on the extent and magnitude of climate change impacts on the ability of physical and societal systems to cope with expected climate changes. Effective adaptation will largely depend on the resilience of these systems and the adaptive capacity of the people and Government of Guyana. The latter will involve available financial and technical skills and the experience of the Guyanese people and government. The process of adaptation is expected to be carried out by the government (including local government), the general population and communities of Guyana, both urban and rural.

The overall goals of Adaptation in Guyana are the promotion of sustainable development and the reduction of vulnerability. Sustainable development will entail ensuring economic development of all the administrative regions, protection of the environment and equitable distribution of the wealth of the nation. Reduction of vulnerability will require minimizing the risks of the impacts, reducing economic losses and alleviating hardships while building the institutional response mechanisms for detecting and warning of the signals of the impacts and for responding to emergencies and other activities required to address vulnerable ecosystems.

The following sectors have been identified as potential sectors in which to carry out adaptation options: Coastal Zone Adaptation, Agriculture and Fisheries Adaptation, Water Resources Adaptation, Energy Adaptation, Forestry and Land Use Adaptation, and Waste Adaptation.

ADAPTATION BY SECTORS

Coastal Zone Adaptation Options

In the short term then there is the need for anticipatory adaptation action in response to rising

sea levels in Guyana. Where communities are likely to adapt to erosion, anticipation can be important. The cost and feasibility of moving a house back depend on design and decisions made when the house is built. The willingness of people to abandon properties depends in part on whether they bought land on the assumption that it would eventually erode away or had assumed that the government would protect it indefinitely. Less anticipation is necessary if the shore will be protected. Nevertheless, some advanced planning may be necessary for communities to know whether retreat or defending the shore would be most cost-effective.

In the medium term, adaptation to sea level rise in the coastal zone of Guyana may involve the further fortifying of sea defences and the introduction of legislation relating to set-back limits so as to reduce the vulnerability of the peoples and structures.

In the long term however, Guyana may have to choose between further fortifications of sea defences or a more drastic population policy whereby peoples and infrastructures will be moved inland, where even at 25 miles the land is at 74 ft above mean sea level (GD). Guyana's population is relatively small and land space in the hinterland is abundant, although soils are mainly sandy. However, the rich agricultural soils are found mainly in the low-lying coastal area.

Agriculture and Fisheries Adaptation Options

In the short term, one strategy to cope with the resulting mismatch between crop requirements and the thermal resources available for growth would be the substitution of crop varieties with greater thermal requirements. However, other characteristics of the growing season may place constraints on the choice of substitutes. For example, moisture constraints due to high evapotranspiration rates would restrict potential plant growth during the dry season. Improvements in farm level management and farm productivity may also be a viable short-term option for coping with the adverse effects of climate change in agriculture.

In the medium to long term, in addition to the farm level adjustments in management and technology, a number of potential regional and national policy responses may also need to be changed. Changes of land use to optimize production may be instituted. Because different crops respond differently to changes of climate and to varying levels of fertilizer application under those climates, any attempt to maximize output of each crop while minimizing production costs is likely to identify quite different allocations of land to alternative crops under different climates.

Water Resources Adaptation Options

In the short term, adaptation to the adverse impacts of climate change in the water resources sector may involve a number of water conservation measures, including metering, the use of time runs where water supply may be staggered according to region or to sectors, the more efficient use of irrigation water using advanced irrigation scheduling methods and the rationing of water during extremely dry years.

As for the medium to long term, adaptation measures may include:

- Stricter water conservation techniques, collection of rainwater for potable and non-potable use in the domestic/commercial/industrial sector, and the development of conservancies and artesian wells in the inland/interior locations as a result of sea level rise and anticipated

inland migration.

- For agriculture use, stricter control and management of supply network, artificial recharge of reservoirs from nearby rivers, removing sediments and weeds from reservoirs for more storage capacity and cultivate crops that are salt-tolerant so as to re-use drainage water, crops that use less water and crops that are commercially important and expensive.
- The relocation of fishing grounds and ponds, depending on the changes in water quality brought about by climate change and sea level rise, the introduction of more salt tolerant species and changes in consumer habits relating to acceptance of new species for local consumption.
- Keeping reservoirs at lower head to reduce evaporation at hydropower sites, changing releases to match other water uses and taking plants off in low flow times.

Energy Adaptation Options

In order to respond to the adverse effects of climate change in the energy sector, adaptation measures in the short term may focus on:

- Energy conservation techniques practical in buildings (commercial/residential/public buildings) such as reducing lighting in and around buildings when not in use or when it serves no purpose.
- Purchasing fuel-efficient machines/equipment and efficient maintenance of same.
- Setting up and implementing a more efficient transportation plan.
- Continuing to set up micro-systems and mini-scales hydropower station in the interior locations in selected areas to be developed.
- Continuing to promote co-generation of energy from using biomass resources (rice husk, bagasse, sawmill waste, slash waste in forest etc) in the sugar, rice and forestry industry.

In the medium to long-term however, adaptation measures may focus on:

- Continuing to promote energy conservation measures/techniques in the different areas (buildings, machines/equipment) as indicated in the short term options.
- Design and construct buildings to reduce the potential use of air conditioning as a result of higher temperatures, thus save on energy e.g. ceiling insulation and glass that transmit less radiation are areas that reduce cooling loads.
- Transportation - use of a mass transit system in the cities and for linking centres of commercial activities.
- Alternative sources of cheaper and less-polluting forms of renewable and sustainable energy such as, further hydropower development and bio-mass co-generation, solar, wind, ocean thermal and wave energy.
- Reduce energy consumption for lighting by use of high efficient Energy Saving Lamps, etc.

Forestry and Land Use Adaptation Options

In the short term, adaptation measures may have to be focused on a redefined forest management plan, addressing such concerns as a forest fire protection plan and stricter control of logging practices, under the supposedly drier climate.

In the medium to long term, the forest management plan may have to be altered to accommodate sustainable logging practices under the perturbed climate. These will include

well-planned logging practices that ensure re-growth of the forests, regular monitoring of forest species to detect changes in mix of species and appropriate remedial action and policy changes, such as dredging if water levels are too low, that will facilitate the riverine transport of logs.

Waste

In the short term then, adaptation measures should focus on improved waste disposal management plans, including the creation of more managed waste sites, especially in urban areas, and the implementation of waste reduction measures, namely reducing consumption and recycling and reusing products.

In the medium and long term however, waste management plans should also include sewage treatment and wastewater recycling that is not only beneficial to human health, but may also be linked to adaptation measures in the water resources and agriculture sectors.

It is evident then, that Guyana may be very susceptible to the adverse effects of climate change, especially of sea level rise. Key sectors of its economy including agriculture and forestry may need to respond to the adverse effects of climate change. The coastal zone of Guyana, where most of the people live and where most of the economic activity is concentrated would be extremely vulnerable to sea level rise. Proactive and purposeful adaptation strategies, with short and long term planning horizons, and on a sectoral basis, would be required to reduce the adverse impacts of climate change and sea level rise. Capacity building is seen as crucial to adaptation. The country must maintain the capacity to detect, plan and respond to the adverse impacts.

5. Key industries and economic activities

The Guyanese economy exhibited moderate economic growth in recent years and is based largely on agriculture and extractive industries. The economy is heavily dependent upon the export of six commodities - sugar, gold, bauxite, shrimp, timber, and rice - which represent nearly 60% of the country's GDP and are highly susceptible to adverse weather conditions and fluctuations in commodity prices. Guyana's entrance into the Caricom Single Market and Economy (CSME) in January 2006 has broadened the country's export market, primarily in the raw materials sector. Guyana has experienced positive growth almost every year over the past decade. Inflation has been kept under control. Recent years have seen the Government's stock of debt reduced significantly - with external debt now less than half of what it was in the early 1990s.

Chronic problems include a shortage of skilled labour and a deficient infrastructure. Despite recent improvements, the government is still juggling a sizable external debt against the urgent need for expanded public investment. In March 2007, the Inter-American Development Bank, Guyana's principal donor, cancelled Guyana's nearly $470 million debt, equivalent to 21% of GDP, which along with other Highly Indebted Poor Country (HIPC) debt forgiveness brought the debt-to-GDP ratio down from 183% in 2006 to 120% in 2007. Guyana became heavily indebted as a result of the inward-looking, state-led development model pursued in the 1970s and 1980s. Growth slowed in 2009 as a result of the world recession, but picked up in 2010-11. The slowdown in the domestic economy and lower import costs helped to narrow the country's

current account deficit, despite generally lower earnings from exports.

6. National development strategy

The objectives of the National Development Strategy which would provide a policy framework and a set of guidelines for the country's development during the first decade of the twenty-first century must therefore provide a blueprint for the attainment of a wide-ranging set of objectives.

First and foremost, a strategy which would lead to the attainment of the highest rates of economic growth that are possible in the time-frame of the NDS must be formulated. This is an imperative. The other developmental objectives of the strategy would be, in large measure, dependent upon rapid economic growth.

The second objective of the strategy is that of poverty alleviation. In addition to the direct concerns for the plight of the most disadvantaged groups, the well-being of all societies depends upon significantly enhancing the living standards of the poor. The attainment of this objective would require not only massive investment in basic services such as health, education, water and housing, but also the formulation and implementation of effective programmes to place low income families on a self-sustaining path of betterment, programmes that are based on well-designed packages of incentives.

The third objective of the NDS may be described as the achievement of geographical unity. In effect, this means integrating the country spatially so that all its regions can become full partners in every sense. This is a matter of the highest national priority, given the present difficulties and costs of internal transport, and the fissiparous tendencies which appear to be growing in Guyanese society. Its urgency is attested to by the facts that several hinterland areas, in which Portuguese is commonly spoken, have more extensive relations with Brazil than with the rest of Guyana; and that Venezuela has unconcealed pretensions to a large part of Guyana's territory. The attainment of this objective would, also, of course, lead to the penetration of the interior and to a more rational distribution of the country's population.

The fourth objective, to a great extent, complements the third. It is the equitable distribution of economic activity. Its primary purpose is the removal of the disparities in income and economic activity among the regions, and the support of the process of shifting the country's population from the coast to the hinterland.

Fifth is the objective of diversifying the economy. The country cannot continue to depend on a narrow economic base, especially one that is so dependent on preferential agreements and tariffs. It is therefore necessary to diversify within the agriculture sector; to extend the range of economic activity to include agro-based industries; and perhaps of most importance, to adapt and apply cutting-edge technology wherever feasible in our country. The argument is that a developing country such as Guyana need not be condemned to repeat the technological learning process that the industrialised nations have passed through. It must attempt to bridge the gap.

To summarise, the objectives of the National Development Strategy are:

1. the attainment of the highest rates of economic growth that are possible, by the year 2010;
2. the alleviation of poverty;
3. the attainment of geographical unity;
4. the equitable geographical distribution of economic activity; and
5. the diversification of the economy.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.2. キリバス

Kiribati

1. Mainstreaming adaptation / mitigation actions in the national development strategy

The Republic of Kiribati is among the most vulnerable countries to adverse impacts of climate change and accelerated sea-level rise. Kiribati people sense their being very vulnerable to sea level rise, which explains the continuing efforts made by the nation to participate in global action programmes to address climate change and its adverse impacts.

There is a growing sense in Kiribati that they should do what they can to mitigate and adapt to impacts of climate change. The strategies identified are in the energy sector, adoption of more appropriate technologies, upgrading of existing energy generation to more efficient level, and introducing steps necessary to reflect environmental costs in the production and distribution of goods and services. For adaptation strategies, the sectors considered important are coastal zone, water resource, agricultural systems and public health.

2. Summary on climate change related issues in the country

- **Climate change policy**

Kiribati ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 7 Feb 1995 and the Kyoto Protocol as of 7 Sep 2000, and submitted their first National Communications Report 24 November 2000. Kiribati government undertakes its climate change activities in collaboration with SPREP and other regional partners. This has to be the strategy because of Kiribati special circumstances, a small island state of low lying atolls, and least developed.

Kiribati is vitally concerned about impacts of global climate change and the need to monitor these impacts. Recognising that this is a global problem to be addressed at the international level, and yet sensing its vulnerability to the impacts from sea-level rise as a low lying and least developed atoll country, Kiribati decides to participate in international forums addressing the wide ranging issues on climate change. It is desirous too to build up its national capability to deal with any adverse impacts. The objective of socio-economic development planning is to generate a sustained, real rate of economic growth, which should be seen against the recognition of global warming and sea-level rise (National Planning Office, 1997).

Kiribati government is enacting a framework law on the management of the local environment, establishing a responsible authority, procedures and mechanisms for public participation in the management, ensuring further that socio-economic development is on sustainable path, and making a commitment to implement any international or regional conventions and agreements on the global environment of which Kiribati is a party.

- **National efforts/measures against climate change**

Kiribati attended some of the first meetings of the IPCC which led up to the production of the first IPCC Assessment Report in 1990. It was also represented at the Ministerial level at the Second World Climate Conference, and at meetings of the small island states on climate change and sea level rise. Consistently, Kiribati has aired its serious concern about a bleak prospect for the future that it now faces under climate change and sea-level rise scenarios.

Other small island states would not hope for a better future and this shared concern about the future has led to the formation of the Alliance of Small Island States (AOSIS) and its recognition in the INC and now the UNFCCC processes. Kiribati participated at the INC sessions, and continues to do so in the UNFCCC Conferences and some of the meetings of the Subsidiary Bodies. The costs of attendance at these meetings have normally been paid for from the UNFCCC Special Funds, and at times by bilateral donors which in the past included New Zealand. It also continues to participate at some of the conferences and workshops arranged by IPCC.

In 1993 Kiribati government formulated and adopted its first National Environmental Management Strategy. One of the objectives is the protection of the natural resource base through programmes which include vulnerability assessment and coastal zone management. It should be noted that at the time, there were no clearly understood methodologies on how to undertake a vulnerability assessment study. Equally there had not been a clear understanding in Kiribati about coastal zone management, although certain laws contain provisions for designating any part of the foreshores for the purpose of regulating, through permitting system, the removal of beach materials. Furthermore, there are provisions on procedures for land reclamation activities, and on land use planning.

A specific programme for climate change is the vulnerability assessment and coastal zone protection which has these aims:- "a) To review works already done on Kiribati's vulnerability to projected sea-level rise, and advance it to a level where it is possible for economic and resource planners to generate appropriate coastal zone management strategies. b) To institute early protection measures against coastal erosion through coastal vegetation establishment and rehabilitation." (Kiribati Government. 1994 p.26). As with all the programmes listed in the NEMS, there was no funding to implement these activities in a systematic way.

Pacific Island Climate Change Assistance Programme (PICCAP), a regional programme, has enabled Kiribati to produce their National Communications report. Public awareness programmes, in the form of workshops, radio programmes, and a newsletter were also initiated. The aim is to inform the public about climate change issues so that they can meaningfully participate at a planned workshop to develop a national policy and action programmes to enhance adaptation, and also to mitigate climate change.

Kiribati has not set up a designated national authority and does not have any CDM projects.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

Kiribati's inventory of greenhouse gases will be regularly updated. But there are recognised gaps in data, and there is not a centralized database with regular updating procedures.

Table 1: GHG emissions by Sector (Gg)

	Year	Gg								
		CO2	CH4	N2O	NOx	CO	NMVO	HFCs	PFCs	SF6
Energy	1994	18.556	8.21E-07	6.77E-09	2.45E-07	8.62E-05	0.000	0.000	0.000	0.000
Industrial Process	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Solvent and Other Product Use	1994	Na								
Agriculture	1994	0	0.023214	8.4623E-06	0	0	0	0	0	0
Land Use Change & Forestry	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Waste	1994	0.000	0.425	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	1994	18.556	0.4483924	8.46907E-06	2.44859E-07	8.62241E-05	0	0	0	0

Please note that data relating to vegetation covers and land use change were not available, and emission factors based on local conditions and different technologies in use in Kiribati were also not available. Emissions of greenhouse gases from soil and plantations also need to be assessed. Waste disposal practices should be assessed for their contribution to the greenhouse gases emissions and for their impacts on water sources and vector diseases.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Kiribati has not submitted its NAMA plan. However, as presented in the "Mitigation/Adaptation Options" sections below, the National Communication of the country raises several mitigation measures.

- **Mitigation Options**

Fossil fuels imported are for the types of the technologies and machineries that are in use in Kiribati. Information on appropriate technologies is required so that practicable options for transfers of those that are more efficient in terms of fuel consumption, and emission levels per output could be encouraged through appropriate policies.

Import tariffs could be made to reflect preferences for cleaner machineries and type of fossil fuels.

Currently there is no duty on home use kerosene, a negligible tariff rate is charged for aviation fuels, a four cents Australian per litre is charged for diesel, and 12 cent per litre is charged for motor spirit (gasoline). Furthermore, kerosene and gasoline are included in the price control regulation. These policies need evaluation in terms of cost to the global environment that they impute through the emission of greenhouse gases.

Electrification of urban Tarawa is supplied by two power plants with the total supply of 2.8 MW. Power loss from the plant, distribution cable, and transformer is unavoidable. However on occasions the plants emit smokes which indicates inefficiency with regard to the use of fuel. Between 1990 and 1994 power losses have varied between 13.8% and 21.6%. Option for mitigation that has been identified is energy saving at end uses.

It is also recognised that the electric grids were designed when demand was lower. Power factors have also decreased especially over recent years, after 1994, which may imply that the electricity may not be optimally produced.

Evaluation of the electricity generation system is also a mitigation option.

Reticulated water supply is provided for residents on South Tarawa and on Kiritimati. As a conservation measure, water supply is rationed. In the past, consumers were charged for the amount of water they used but maintenance and monitoring of the system had proved problematic and was discontinued. Water meters and rates would provide better means of monitoring consumption at the end use level.

Photovoltaic cell systems are used in some rural areas to provide lighting for community buildings and some traditional houses. On some islands, solar pumps are installed to bring water from wells located away from the village areas closer to the households. Solar water pumps are also installed at the secondary schools in rural areas. This system has discouraged the inevitable increase in the use of small power generators at the rural areas. Solar energy technology, its development, and application should be encouraged.

In South Tarawa, the Public Utilities Board (PUB) has a monopoly in the generation and distribution of electricity. The current policy is to encourage competition to supplement the PUB's supply (National Planning Office. 1997).

There is an increase in the number of vehicles running on the road. The number of private passenger cars is increasing faster than the number of vehicles currently used for public transport. Import tariffs for the former are higher than for the latter. However, the tariffs do not distinguish between new vehicles and used vehicles. Tariffs could be made to reflect more of the contributions that the different vehicles are expected to make to the greenhouse gas emissions.

Trees and plants that are recognised as being owned by landowners are well managed and protected. But other trees and shrubs are freely exploited, or simply cleared, and are not replanted. Grasses are normally weeded out as they are considered as waste. This traditional attitude about cleaning is being discouraged through radio programmes and replanting of these

wild trees and shrubs is encouraged through biodiversity programmes. Public awareness programmes to extend value systems to include environmental resources should contribute to the mitigation of climate change.

Waste disposal in the urban area of South Tarawa is in the form of open dump. The site is normally at the shoreline and in a number of cases waste streams disposed have been used as fill materials for land reclamation. Open dumping and other engineering methods for managing waste disposals would have different emission factors. Alternative forms of waste disposal could produce less methane than open dumping.

Research on the atoll system and human activities, including agro-forestry, shore based fisheries activities, and waste disposals should also provide knowledge leading to the recognition of other potential options for mitigation.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

The atolls of Kiribati are most vulnerable to the impacts of climate change which include accelerated sea-level rise. This is because of their small sizes, low lying topography, limited resource endowment, and also because Kiribati is a least developed country. This implies that these atoll systems would not be able to adjust to the adverse impacts of climate change and sea-level rise without serious repercussions on the national socio-economic circumstances. It also implies that some of the atolls would soon be unable to support human habitation. Sealevel rise poses a serious threat to Kiribati. President Tito explains this sense in these words, "Our hopes in celebrating a 'Millennium in Harmony with Nature' are being shattered by the failure of the KYOTO Conference to give sufficient guarantee for a secure future in the next millennium for low-lying islands like Kiribati" (Sawada, undated. p.5).

In several workshops at which climate change and sea level rise were presented as new factor to take into account in planning for management measures for the atoll ecosystems, a persistent question for which offered answers never satisfied participants was "what is Kiribati government doing about climate change?" In truth, people in Kiribati get worried to hear climate change and sea level rise, but are anxious to be able to do something for themselves. They do not think that the Kyoto Protocol target of about 5% reduction of greenhouse gases on the 1990 level is "sufficient for a secure future" for Kiribati.

Adaptation is taken to mean any activities that either reduces adverse impacts of the global warming, or enhances any consequential adjustment of Kiribati peoples lifestyles to fit in with the adverse impacts. IPCC has suggested three forms of adaptation to sea level rise. They are accommodation, protection, and retreat. A fourth option should be external resettlement but this is an option to signal the failure of the human race to have used and managed the global environment wisely. Accommodation in Kiribati case would include internal migration, and this option would depend on more detailed assessment of the varying degrees of the vulnerability of the different atolls.

Planning for adaptation is clearly complex. There are non-climatic factors which would either adversely, or positively affect the ability of Kiribati people to adapt to yet climate change and sea level rise scenarios. The former situation is more likely to be the case.

- **Summary of National Adaptation Programme of Action (NAPA)**

In its National Adaptation Programme of Action (NAPA), Kiribati builds upon these observations to identify nine key areas in which adaptation action is required. These nine key areas include implementation in the areas of:

- Freshwater–A water resources adaptation project; and a well improvement project to improve public health;
- Coastal zones–A coastal zone management program for adaptation;
- Risk reduction and monitoring–A strengthening of climate change information and monitoring program; upgrading of coastal defences and causeways; and upgrading of meteorological services;
- Marine resources–Coral monitoring, restoration and stock enhancement; and
- Agriculture–Agricultural food crops development.

- **Adaptation Options**

The Initial National Communication to the UNFCCC released in 1999 describes the vulnerabilities of the country, with a focus on the potential adverse impacts of sea level rise. The impacts include brackish water invasions, coastal erosion and reduced groundwater quality and quantity. Throughout the document, there in an emphasis on the melding of traditional practices in agriculture and extreme weather event preparation. This report includes a list of projects planned by the Kiribati government to address is adaptation needs, including (MESD, 1999):

- Establishment of a climate change and sea level monitoring centre.
- Formation of an integrated coastal zone management plan.
- Public awareness programming.
- Education and training program.
- Research and information dissemination.
- Technology transfers program.
- Water supplies program.
- Alternative energy source program.

5. Key industries and economic activities

Kiribati economy is based on government expenditures, foreign aid, and on the service sector in the country. There are few small manufacturing industries, and the import bill far exceeds the export bill, which is based on copra and some fish products. Very little specialisation exists within the small service and industrial sectors.

Gross domestic product is used as measure of national wealth. However, subsistence activities

and products, and those that do not enter into the formal market system are generally difficult to value. There are traditional knowledge and skills forming the basis, together with natural resources, for subsistence way of living and activities. Significant cultural sites have also spiritual values but which are not subjective to evaluation based on monetary measure.

Comparison of GDPs at constant prices over the years from 1990 to 1995 indicates an annual growth rate of about 3%, from $A40.6 million to $A49.2 million (National Planning Office. 1997). Per capita GDP shows also an annual growth of about 2%, from $A567 to $A614.

Inter-annual fluctuations in the GDPs are largely explained by changes in copra world prices and fishing licenses for distant water fishing nations. With the "Trade" sector, the primary sector is second to Government expenditures in its contribution to the GDP. Contribution from private housing sector has steadily increased which could reflect increased aspiration for western type of housing than traditional housing. Transport appears to be steadily increasing.

The highest contributor to the GDP is government spending or the public sector. In other words, the economy of Kiribati is dominated by the public sector. In 1990 the government expenditure was 75.6% of the GDP, and in 1995 it was 89.3%. The increase is due to the increase in expenditures in the social services. However, in terms of cash employment, the public sector accounted for about 79% and 67% for the years 1990 and 1995 respectively. This drop might indicate an increase in the private sector employment relative to the public sector.

Dependency of Kiribati on foreign aid for development is an important aspect of the economy, particularly in financing trade deficits. Currently indebtedness is not a problem. However, in recent years, foreign aid has been decreasing, and the contribution to GDP from this source is also declining.

The only significant export commodities from Kiribati are copra, and fish. Copra production increases from 4682 tons in 1990 to 13,159 tons in 1995, the highest production since 1979. This might be a response to the high subsidy paid for copra since 1995. It also indicates that there is real potential to increase copra production. On the other hand, the volumes of export of fish and other marine products declined over the same period, and the annual import bill has always been higher, creating annual deficits in the balance of trade, since independence and the ending of the mining of phosphate from Banaba.

6. National development strategy

Kiribati economic development objectives are based on the national aspiration to increase the per capita income of the people. This is a shift from the pre and early independence policy when the objective was self reliance. Productive sectors and infrastructure, and rural development were then given priority.

The current developmental objectives take greater account of the potential of human resource to raise national productivity, and entrepreneurs acumen in developing the nation. Greater

resources are being allocated to social services, in particular education, and there is less emphasis on population planning. Restructuring of the economy is also being pursued.

These policies have implications for sustainable development. Adverse environmental impacts and consequences of failures of the earlier policies are now being addressed, such as the construction of openings to solid causeways. The current policies based on human resource development and the restructuring of the economy would in future show their impacts, including most likely an over exploitation of environmental resources. This means over exploitation of the land as a living area and habitat for tree crops and vegetation, and of the marine areas as habitat for marine living resources could both be avoided by taking stronger measures in the management of the environment. At the same time immediate benefits from a cleaner environment would be realised. Environmental considerations need to be integrated into economic planning.

The first option would be to enact an environmental framework law, and to effectively implement such laws. Kiribati government is processing an environmental Bill through parliament. Environmental Impact Assessment process and pollution controls form important parts of this Bill.

More effort is needed to enhance Kiribati people's awareness of their environment and climate change issues. Furthermore, the level of awareness should be such that it will be possible to redefine some of the motives of people in their activities that have direct impacts on the environment.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.3. クック諸島

Cook Islands

1. Mainstreaming adaptation/mitigation actions in the national development strategy

Although the Cook Islands' green house gases (GHG) emissions are insignificant compared to the rest of the world, the second GHG Inventory found emissions have increased with reliance on fossil fuels for development. They now have targets for renewable energy to reduce this dependence and are proud to say that they are now on a pathway towards a cleaner and greener Cook Islands.

The Cook Islands' most vulnerable sectors are coastal, marine, water, agriculture, biodiversity, human health and socio-economic activities like tourism, pearl farming and agriculture. It is clear that climate change is affecting the people, culture and ecosystems and the Cook Islands' way of life. As a Small Islands Developing State with many low lying atolls, science indicates the Cook Islands will see worsening climate changes. Significant adaptation efforts are required to respond to this.

2. Summary on climate change related issues in the country

- **Climate change policy**

The Cook Islands ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 12 June 1992 and the Kyoto Protocol on 16 September 1998, to work together with the international community to avoid dangerous climate change. The Cook Islands submitted their first Nation Communications Report in 1999, and have just recently submitted their second report (2NC) as of 12 April 2012.

While a Party to the Kyoto Protocol and to the UNFCCC, the Cook Islands has participated and accessed multilateral funds provided under the Convention on regional and national climate projects, many of which have been identified in its most recent and the previous National Communication.

Nevertheless, the Cook Islands continue to incur a higher cost and burden for increasing impacts of climate change. While addressing these impacts is a priority, the Cook Islands are constrained severely through priorities to other key sectors, such as health and education. For its part the Cook Island Government is moving toward a coordinated approach to addressing climate change through legislative, policy, and sector level activities that in turn will assist it to cope with a changing climate.

The Cook Islands does not yet have an overall climate change policy but this is being planned for and is a priority in light of the scientific evidence presented in the Intergovernmental Panel on Climate Change (IPCC) reports which state that climate change is happening and human activities

are releasing more GHG than ever. Findings from the IPCC as well as those of national studies presented in the National Communications Report indicate the resulting impacts of shifts in climate elements like rainfall, temperature, wind, sea-level, increased frequency and intensity of extreme climate events like cyclones and storm surges, and ocean acidification threaten the ability of the Cook Islands to meet its sustainable development objectives.

Designing a comprehensive policy is a challenge because a range of domestic bodies are responsible for drafting and influencing policy in relation to climate change and the implementation of the Convention, but their resources are committed to other development priorities. Impacts of climate change affect different sectors and no one agency has a core function related specifically to climate change, although the National Environment Service (NES) has led to date in terms of its responsibilities for multilateral environmental agreements under its Act.

For this reason a functional review of climate change within government was undertaken as part of the 2NC with additional support from the Government of Australia. This functional review was conducted to see how institutional arrangements for climate change can be strengthened within government and receive prominence in the national agenda. As a result, the Government of the Cook Islands established Renewable Energy and Climate Change Coordination offices within the Office of the Prime Minister in 2011. These Offices will start institutionalising and coordinating climate change related activities and initiatives, drive policy work and facilitate implementation.

- **National efforts / measures against climate change**

The National Sustainable Development Plan (NSDP) strategies are national priorities and all sector and government agencies planning is aligned to these strategies. While none of the Strategic Goals explicitly reference climate change; several references are cross cutting across the goals. Currently the NSDP, the National Environment Strategic Action Framework (NESAF), the National Action Plan for Disaster Risk Management (NAPDRM), and the Renewable Energy Road Map are under review, with preparation of the strategies to 2015 underway.

The Government of the Cook Islands has increased its focus on addressing climate change since the Initial National Communication to UNFCCC (INC), including through engagement of an enhanced multistakeholder climate change country team, more active participation in international negotiations, national capacity building and awareness raising, and recently the establishment, within the Office of the Prime Minister, of new coordination offices for renewable energy and climate change. Local Non-Government Organisations (NGOs) have also increased their involvement in climate change related activities. A number of externally supported pilot projects and planning activities have been undertaken since the INC.

The Cook Islands has not set up its designated national authority and does not have any CDM projects.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

The Cook Islands Inventory for Greenhouse Gases has been calculated for the year 2000–2006 using the 2006 IPCC Guidelines. The Cook Islands currently emits 69,574 t CO2-e. This is a 34% increase from the first inventory which was published in 1999 and covered emissions for 1994.

This increase reflects the growth in the economy with the main drivers being tourism and transport sectors leading to an increase in demand on energy use. Emissions in the energy sector increased more than other sectors. The Cook Islands Industrial Sector has changed little since the INC, as the Cook Islands is a service oriented economy rather than industrial. There were some significant reductions in the land use emissions sector due to the introduction of the Rarotonga and Aitutaki managed landfills in 2003 which replaced open burning. Since the 2006 inventory overall emissions are likely to have continued to increase, however there are capacity limitations to collecting the data and conducting the GHG analyses more regularly.

Table 1: GHG Emissions by Sector (Gg)

Greenhouse gas source and sink categories	CO2 Emissions Gg	CO2 Removals (Gg)	CH4 (Gg)	N2O (Gg)	CO (Gg)	NOX (Gg)	NMVOC (Gg)	SO2 (Gg)
Total National Emissions and Removals	55.18	-166.97	0.33	0.0160	1.65	0.32	0.33	0.0742
1 ENERGY	54.45		0.0078	0.0015	1.65	0.32	0.31	0.0740
2 INDUSTRIAL PROCESSES AND PRODUCT USE	0.59		NE	NE	NE	NE	0.0113	NE
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	0.00425	-166.97	0.17	0.01118	NE	NE	NE	NE
4 WASTE	0.1383	0.0000	0.1516	0.0033	0.0002	0.0003		0.0002
5 OTHER	NE		NE	NE	NE	NE	NE	NE

Key: NA = not applicable, NE = not estimated, NO = not occurring

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

The Cook Islands has not submitted its NAMA plan. However, as presented below and in the "Mitigation/Adaptation Options" sections below, the National Communication of the country raises several mitigation measures for the country.

An effective greenhouse gas emissions mitigation strategy has to confront a number of institutional barriers. There is a need for some policy changes in order to improve the enabling

framework for renewable energy and energy efficiency investments and for improved management of municipal and agricultural wastes.

Policies needed include:

- Inclusiveness of major stakeholders in relevant strategic discussions and implementation committees;
- Definition of role of private sector as provider of technology and of financing services;
- Establishment of regulatory framework and standards for energy technologies and grid assess (net metering and IPP grid assess codes);
- Institutional framework and unambiguous mandate for certification of technologies and technology providers/installers; and creation of independent, external advisory panel for assessment of new technologies to be introduced;
- Minimum efficiency standards for buildings designs, and important equipment such as household appliances, air conditioners, lights and vehicles.

While the need to develop renewable energy has been clearly stated in a host of national policy documents and enjoys widespread public support, few renewable energy projects are currently moving toward implementation. It has proved difficult to put policies in place regarding imports of only energy efficient appliances, as the private sector has often countered that this should be left to consumer choice.

A report by SPREP in 2004 found that "public and private sector capacity limitations in renewable energy expertise and knowledge are barriers to the widespread use of energy efficiency measures in the Cook Islands. An increased capacity and understanding of renewable energy alternatives is needed to prevent the adoption of policies based on 'crisis management' and the continued reliance on fossil fuel energy and technology as a business as usual solution.

From speaking with stakeholders it is clear that many possess a good knowledge of renewable energy solutions and have been actively exploring different options, the difficulty often comes in securing Government funding for the initial feasibility studies and ongoing capacity building, particularly in terms of practical aspects such as installations and their maintenance. Government support also is limited in terms of creating economic incentives to adopt renewable energy technologies. The state-owned electricity supplier Te Aponga Uria does currently allow net-metering of grid connected household solar panels or personal wind generators up to 2KW, and off-grid generation with storage is not limited. Technology constraints on the grid's stability with variable renewable energy inputs have resulted in the limitations to net metering.

Concerns have been expressed by stakeholders (Tourism, Maritime Cook Islands shipping registry, Airport Authority) about proposed measures at the international level to encourage the mitigation of emissions from bunker fuels, given the Cook Islands reliance on both national and international aviation and marine transport. The potential additional cost burden from multi-lateral or unilateral measures on the Cook Islands is seen as unfair when costs of adaptation to the impacts of climate change are already too high. Options for redressing these concerns remain to be identified and implemented, through technical and operational measures under the International Maritime Organisation (IMO) and the International Civil Aviation Organisation, as well as any

consideration of target setting for the emissions from the international transport sector under the UNFCCC.

- **Mitigation Options**

There are now emissions mitigation measures in development for the Cook Islands, some of which are captured in the Renewable Energy Chart. The Mitigation Technology Needs Assessment conducted under the 2NC found it is important the Cook Islands adopt technologies that are proven in regions with similar climatic and economic conditions. Such technologies can be demonstrated, promoted and disseminated through the private sector, i.e. GHG mitigation needs to achieve lower carbon growth and be supportive of national development priorities and local business opportunities.

It is estimated that 2MW of renewable energy replacing 2MW of diesel on Rarotonga would reduce 10,005 t CO2-e per year. This would provide the additional benefit of increasing security of energy supply and reducing dependence on imported fossil fuels. This is consistent with the long-term objective of the Cook Islands Government of self-sufficiency of energy resources. Hence there is a lot of political will manifested in the 2010 Government's targets of 50% renewable energy by 2015.

Work undertaken for sustainable land management can also contribute to emissions reduction and waste emissions management strategies such as the introduction of properly designed landfills could be extended to the other Pa Enua for further reductions in the land use sector.

An effective mitigation strategy needs to address a number of institutional barriers. There is a need for some policy changes in order to improve the enabling framework for renewable energy and energy efficiency investments and for improved management of municipal and agricultural wastes. In the energy sector, institutional arrangements have been in flux over the past decade. An adequately resourced regulatory body that could set and enforce rules, regulations and performance standards promoting efficiency and the development of indigenous resources is required.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

Cook Islands life and culture are interdependent and related to land, ocean and environment. The changes in climate parameters and adverse impacts related to climate variability and change are a significant threat to the biodiversity and ecosystems, the lives of its people and the economic viability of the islands.

There is strong evidence that indicates that long-term weather patterns are shifting, although there is some uncertainty about specific parameters and the rate of future trends. Climate trends and projections analysed through the 2NC indicate cause for even more concern with increasing temperatures, rainfall and winds, rising sea levels, and in the frequency, intensity and

duration of extreme events. There is comparatively higher risk and more is now known about the likely impacts as well as emerging issues such as ocean acidification than was reflected in the INC.

Key vulnerabilities to climate change have not changed significantly since the INC however as part of a comprehensive approach toward understanding and documenting fully its vulnerabilities, the Government along with a wide range of relevant and interested stakeholders has begun to prepare vulnerability assessments for each of the islands in the country. In combination with the analyses of climate trends a clearer picture of both the impacts and the adaptation options to cope with these is emerging.

The vulnerability of the coastal zone, coral reefs and marine resources is significant given it is where most people live and work. The ocean and subsistence agriculture are sources that Cook Islanders have always relied on for food. Other sectors such as water supply and quality, and liquid and solid waste are increasingly vulnerable to changes in climate parameters such as rainfall, storm events, droughts, and sea level rise. These effects in turn will impact upon the lifestyles and conditions of the people in the Cook Islands both socially and economically.

Some adaptation measures across vulnerable sectors have been identified and are increasingly being mainstreamed in external development partners' activities in the Cook Islands as well as domestically by the Government and Non-Government sectors. However, existing national development priorities and resource constraints have limited wide scale implementation of climate change adaptation to date.

Climate change adaptation is an additional burden to the Cook Islands existing development priorities which would be minimised if the international community takes more action to reduce emissions. The costs of dealing with extreme events have increased significantly in the past decade and slower-onset events are generating alarming land tenure and security implications for parts of the Cook Islands. Therefore the Government is seeking external support and innovative risk management mechanisms for adaptation.

- **Summary of National Adaptation Programme of Action (NAPA)**

The Cook Islands has not submitted its NAPA to the UNFCCC.

- **Adaptation Options**

A number of adaptation priorities have been identified to reduce vulnerability to the anticipated impacts from climate change in the 2NC. Some adaptation measures across vulnerable sectors have been identified and are increasingly being mainstreamed in external development partners' activities in the Cook Islands as well as domestically by the Government and Non-Government sectors. However, existing national development priorities and resource constraints have limited wide scale implementation of climate change adaptation to date.

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priorities which would be minimised if the international community takes more action to reduce emissions. The costs of dealing with extreme events have increased significantly in the past decade and slower-onset events are generating alarming land tenure and security implications for parts of the Cook Islands. Therefore the Government is seeking external support and innovative risk management mechanisms for adaptation.

A number of key gaps and constraints have been identified by participating stakeholders since the INC. Possible initiatives to address these gaps and constraints are:

- Comprehensive climate and risk information availability through research and assessments for all islands to improve understanding of specific vulnerabilities and current and future resilience and to provide a basis for education and awareness.
- Capacity building on implementation of renewable energy technologies for longer term operations of these energy systems over current imported fossil fuels and diesel powered energy.
- Institutional strengthening of the national body to oversee climate change issues, to ensure a coordinated and wider network of government and non-government stakeholders are involved in climate policy development and project design and implementation
- Greater integration of climate change in all planning and implementation including socio-economic programs and projects.
- Enforcement of climate adaptation and mitigation relevant policy and regulations with the capacity and capability of national human resources.
- Participatory approaches to address land issues which impede sustainable development with due consideration of traditional tenure systems at national and local levels.
- Financing of climate activities and budget constraints in light of other development priorities.
- Improved availability of affordable quality consultants through ongoing capacity building and resourcing at the national level.
- Proactive engagement in the international negotiations so that obligations under UNFCCC are not excessively burdensome for Small Islands Developing States (SIDS).

5. Key industries and economic activities

The tourism sector is now one of the Cook Islands' main revenue sources along with financial services, black pearl exports, fisheries and agriculture. After two years of contraction, the Cook Islands' economy in 2011 shows positive growth prospects for the next two years.

Like many other South Pacific island nations, the Cook Islands' economic development is hindered by the isolation of the country from foreign markets, the limited size of domestic markets, lack of natural resources, periodic devastation from natural disasters, and inadequate infrastructure. Agriculture, employing more than one-quarter of the working population, provides the economic base with major exports made up of copra and citrus fruit. Black pearls are the Cook Islands' leading export. Manufacturing activities are limited to fruit processing, clothing, and handicrafts. Trade deficits are offset by remittances from emigrants and by foreign aid overwhelmingly from

New Zealand. In the 1980s and 1990s, the country lived beyond its means, maintaining a bloated public service and accumulating a large foreign debt. Subsequent reforms, including the sale of state assets, the strengthening of economic management, the encouragement of tourism, and a debt restructuring agreement, have rekindled investment and growth.

6. National development strategy

"Te Kaveinga Nui" contains the key planning document, the National Sustainable Development Plan (NSDP) 2007–2010, NSDP 2011–2015, and 2015–2020. The objective of the NSDP is 'to build a sustainable future that meets our economic management, environment integrity, social stability, and our Cook Islands Maori culture, and the needs of our future generations.'

All sector and government agencies planning must be aligned to the NSDP strategies as national priorities. While none of the current Strategic Goals explicitly reference climate change several goals have particular relevance:

- Goal 4 "Sustainable use and management of our environment and natural resources",
- Goal 5 "Strengthened and affordable basic infrastructure, transport and utilities to support national development"; and
- Goal 6 "A safe secure and resilient community".

The NSDP furthermore is aligned with the nation's regional and international commitments such as the Pacific Plan, Millennium Development Goals (MDG), Mauritius Strategy, and multi lateral environmental agreements such as the UNFCCC, Convention to Combat Land Degradation & Desertification (CCD) and the Convention on Biological Diversity (CBD).

The National Environment Strategic Action Framework (NESAF) 2005–2009 and 2011–2015 is referenced in the NSDP and provides guidance and direction for achieving the sustainable social and economic progress for the Cook Islands utilising its natural resources and environment wisely. The third goal of the NESAF is to increase resilience by strengthening national capacities for climate change, variability, adaptation and mitigation. Currently both the NSDP and the National Environment Strategic Action Framework are under review, with preparation of the strategies to 2015 underway.

Alongside the development of these strategies and plans are a wide range of consultations and discussions on how climate change would affect society in the Cook Islands and how society would move to mitigate and adapt to those effects. An environment forum was organized and held in Rarotonga, July 2010, where stakeholders discussed the many issues confronting the Cook Islands. A climate change planning week was held in March 2011 and explored in more depth adaptation, mitigation, technologies and sustainable financing. The issues traversed climate change as well as a broader spectrum of sustainable development issues.

Non-Government Organisations have called for more effort on local versus national obligations noting partnerships between community and government are viewed as an important factor to

addressing climate change impacts. The responsibilities of policy development and implementation are not clearly articulated under the current arrangements. Recognising NES in its role as an environment manager, as well as Emergency Management, Cook Islands are not adequately staffed to meet the workload demand of climate change so there is a call for more effective leadership with policy development and project implementation tasks delegated to the relevant sectors in government so the workload is shared and manageable.

Outcomes from these forums are consistent with the national framework strategies and plans identified above and reaffirm that the Cook Islands needs assistance and support from the international community to address the wide range of impacts already being experienced through climate variability in the context of longer term climate change.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.4. グレナダ

Grenada

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Grenada's First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) (submitted in 2000) notes the following sectors as being particularly vulnerable to the impacts of climate change: freshwater supply, agriculture, fisheries, coastal zones, and human health.

Grenada is currently participating in a high number of regional projects relative to other Caribbean countries that address climate change adaptation. Projects are being funded by various multilateral and bilateral sources, including the Food and Agriculture Organization (FAO), the Global Environment Facility (GEF), the World Bank, and the United States Agency for International Development (USAID). Of note, Grenada is one of six countries receiving funding for pilot actions under the Red Cross/Red Crescent's "Pilot Program for Climate Resilience." Current adaptation projects in Grenada focus on the areas of agriculture, disaster risk management, coastal zone management, freshwater supply, gender and tourism; several are focused on enhancing the capacity of government to create an enabling environment for adaptation. Most projects support capacity building, knowledge communication and fostering policy formation and implementation.

2. Summary on climate change related issues in the country

- **Climate change policy**

Grenada ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 11 August 1994 and the Kyoto Protocol on 6 August 2002, and submitted their first National Communications Report on 21 November 2000.

There is no coordinated policy framework for the management of the environment in Grenada. Even in cases where there is clear sectoral responsibility, clear-cut policy frameworks are few and far apart. A small number of initiatives to remedy this situation has been initiated since 1994, the most significant being the institutionalization of the Grenada Solid Waste Management Authority in 1996 and the development of a Forestry Policy and Strategic Plan in the 1997 – 2000 Period. The elaboration of a Biodiversity Strategy and Action Plan in 2000 has also been a significant development in this regard.

Grenada will establish a coherent institutional framework for the management of the environment. This framework will maximize the synergies which exist between climate change and the many other environmental issues that are of concern at the national level and will maximize Grenada's participation in the various environmental conventions to which it is a signatory.

This institutional framework will include:

- Responsibility/Authority – A centralized locus of responsibility and authority will be identified for the management of environmental issues and concerns. This centralized authority will be responsible inter alia for providing overall guidance and management on environmental issues, as well as for the facilitation and coordination of the relevant activities being implemented in other ministries and organisations.
- Policy Framework – A Policy Framework will be developed for the management of climate change issues. This framework will use, as a starting point, the policies and measures proposed by this Initial Communications Project. It will expand and develop on these basic proposals through a participatory process that will involve stakeholders at every level in the society, including the residents of the communities expected to be impacted by climate change.
- Legislative Frameworks – Appropriate legislation to support the implementation of climate change policies and measures will be enacted, once the appropriate

- **National efforts/measures against climate change**

The national response measures described in this section are based on the foregoing analyses of greenhouse emissions and vulnerability to climate change impacts, in the context of the projections for the socio-economic development of Grenada into the medium term. The measures recognise the critical need for Grenada to expedite the analysis and implementation of its options to adapt to the adverse impacts of climate change, while fulfilling its obligations under the Convention to reduce greenhouse gas emissions.

They represent a mix of strategies and actions that will be kept under constant review and will be revised and adapted based on evolving circumstances in each of the relevant sectors and in the overall scenario of climate change.

The proposed short list of priorities is:

(1) Strengthening of the Institutional Framework.
(2) Strengthening of the data collection and monitoring systems to facilitate the collection and analysis of data relevant to climate change.
(3) The development and implementation of a National Energy Plan, with emphasis on increased energy efficiency and the use of renewable technologies.
(4) The provision of tariff and fiscal incentives for the use of renewable technologies.
(5) The development of national standards for vehicle and industrial emissions, minimum efficiency ratings on domestic appliances and industrial equipment, as well as a mechanism for ensuring the implementation of these standards.
(6) The implementation of the Solid Waste Authority's plans aimed at reducing the volume of waste that has to be accommodated in the landfill.
(7) The elaboration and implementation of a Land Use Policy.
(8) The implementation of the Forestry Policy.
(9) Initiation of research into flood control technologies that can be used in the flood prone areas.
(10) Compulsory inclusion of climate change considerations into all national projects being developed in the sensitive sectors

(11) Public Awareness and Education on the climate change in general and the role of the individual in mitigating and adapting to climate change.

(12) Continuation of the analysis of Grenada's vulnerability to the adverse impacts of climate change with the objective of informing policy response measures.

(13) Strengthen Grenada's participation in the UNFCCC negotiation process, in order to strengthen the developing country lobby for the provision of resources to cope with the adverse impacts of climate change.

Energy Division of Ministry of Finance, Planning, Economy, Energy, Foreign Trade and Cooperatives of Grenada is designated national authority for CDM. Grenada is involved in one of multiple countries Programmatic CDM projects under validation. The project aims to replace existing and predominant use of kerosene-based lighting with purpose designed LED/CFL lamps in the household.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

The Grenada inventory of greenhouse gas emissions and removals by sinks have been calculated for the base year 1994 using the Revised Intergovernmental Panel on Climate Change (IPCC) Guidelines (1996) for National Greenhouse Gas Inventories.

Table 1: GHG Emissions by Sector (Gg)

Greenhouse Gas Source and Sink Categories	**CO2**	**CH4**	**N2O**
Total (Net) National Emission (Gigagram per year)			
1. All Energy			
Fuel combustion	135	0.02	0.002
Energy and transformation industries	62		
Industry	4		
Transport	52		
Commercial-institutional	6		
Residential	10		
Other (Agriculture, Forestry and Fisheries)	1		
Biomass burned for energy	n.e.		
Fugitive Fuel Emission			
Oil and natural gas systems	n.a		
Coal mining	n.a		
2. Industrial Processes			
3. Agriculture			
Enteric Fermentation		0.00324	
Manure Management		0.00106	
Solid Waste Disposal		70	
Agricultural Soils			0.00108

4. Land Use Change and Forestry			
Changes in Forest and other woody biomass stock	(92)		
Forest and Grassland Conversion			
Abandonment of Managed Lands			
5. Other Sources as appropriate and to the extent possible (please specify)			

Notes: n.a. – not applicable; n.e – not estimated

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Grenada has not submitted its NAMA plan.

- **Mitigation Options**

The principal objective of the National GHG Mitigation Plan is the reduction of greenhouse gases emanating from the energy and non-energy sector, through the implementation of policies, strategies, and specific measures for the different GHG emission sectors. The plan addresses:

- the supply and demand of energy;
- the management and treatment of waste;
- the protection of forestry reserves; and
- the management of land use.

The available options for mitigating the level of GHG emissions are:

- Increasing the efficiency of energy use throughout the energy chain. This will contribute to the reduction of GHG from this sector, and will positively impact on the cost of production (thereby enabling or enhancing national and international competitiveness).
- Optimizing electricity generation, transformation and distribution systems, in order to improve the overall efficiency.
- Developing and implementing demand-side management, and energy conservation programs in the electricity sector by the respective utility, in order to: - Invest in new technology, and more efficient processes and equipment; and;
- Induce or convince the consumer to behave differently and thereby conserve energy.
- Pursuing energy diversification, through the application/use of appropriate and sustainable alternative sources of energy.
- Development and execution of forestry management plans that are designed to protect and conserve forestry reserves and to increase their stocks of carbon.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

There is still a significant amount of analytical work required in determining the specific vulnerabilities of Grenada to climate change. The specific vulnerabilities of the coastal zone are currently being analysed by the Caribbean Planning for Adaptation to Global Climate Change

(CPACC) Project and there is a need to initiate similar specific analyses for the other sensitive sectors.

However, the initial analysis indicates that Grenada is potentially very vulnerable to the adverse impacts of climate change in a number of areas:

- Decreased annual precipitation and higher temperatures could lead to reduced domestic water availability in the dry season, and to reduced yield among the principal agricultural export crops – nutmeg and bananas.
- Higher wet season precipitation and temperatures could increase the spread of tropical disease vectors and could create health problems for the population.
- Higher sea surface temperatures could adversely affect the domestic fish catch and negatively impact on the protein supplies available to the population, as well as on the incomes of fishermen and fisherwomen.
- Sea level rise could result in flooding and inundation and adversely affect the coastal settlements where at least 19% of the population live and where most of the significant socio-economic infrastructure – airports, ports, roads, telecommunications facilities, electricity facilities, tourism plants, sporting and cultural facilities – is located.
- The important tourism industry could be adversely affected through loss of important beaches and threats to hotel plants, inter alia.
- Grenada's exposure to extreme climatic events like hurricanes will increase, with consequent implications for damage to property and key infrastructure, as well as loss of human life.

- **Summary of National Adaptation Programme of Action (NAPA)**

Grenada has not submitted its NAPA.

- **Adaptation Options**

Adaptation should not be considered exclusively from a closed climate change perspective, since socioeconomic issues would influence the impact of those changes. The adaptation strategies must therefore be considered in their relationships with other change factors within the country.

From a strategic adaptation perspective, there are many options available. Many of these are "no regrets" options, which would be beneficial to Grenada, whether or not the anticipated adverse impacts of climate change actually materialize.

<u>Water Resources</u>

The adaptation responses must address the immediate objectives of making water accessible to all in adequate quality and quantity at affordable prices. The responses must also address anticipated changes in water availability due to climate change and sea level rise.

Options:

Improved Water Resources Assessment and Monitoring
Planning and Management of Water Resources
Protection of forest reserves

Rainwater collection
Desalination
Importation
Non-potable water sources
New water storage
Community Education and Awareness
Conservation

Agriculture

Adaptation responses in agriculture in Grenada must address the anticipated impact of climate change on the traditional sector, keeping in mind at the same time, the possible direction of the agricultural industry.

Options:
Development of a National Land Use Policy
Efficient Irrigation Water Use
Soil and Water Management
Agroforestry
Research and Development Unit

Coastal Zone and Tourism

Measures to protect coastal zones are important to ensure their long term sustainable management. Such measures include policy, legislation and enforcement to ensure that construction and extraction activities do not endanger sensitive margins.

Options:
Engineering Works
Building Setbacks
Flood Control Measures
Mangrove Replanting
Relocation
Location of Hotels
Roads
Substitution for Local Sand

Human Health

At the local level adaptation to climate change to ensure good health would require comprehensive national health policies to include planned education programs with community involvement. However, adaptation measures need to be relevant to the current situations and not be over emphasized on predictions of future events.

Options:
Surveillance and Monitoring
Infrastructure Development
Public Education

5. Key industries and economic activities

Grenada relies on tourism as its main source of foreign exchange especially since the construction of an international airport in 1985. Hurricanes Ivan (2004) and Emily (2005) severely damaged the agricultural sector - particularly nutmeg and cocoa cultivation - which had been a key driver of economic growth. Grenada has rebounded from the devastating effects of the hurricanes but is now saddled with the debt burden from the rebuilding process.

Public debt-to-GDP is nearly 110%, leaving the THOMAS administration limited room to engage in public investments and social spending. Strong performances in construction and manufacturing, together with the development of tourism and an offshore financial industry, have also contributed to growth in national output; however, economic growth remained stagnant in 2010-11 after a sizeable contraction in 2009, because of the global economic slowdown's effects on tourism and remittances.

6. National development strategy

The overall vision of the Government to address the poverty condition in Grenada is to return the economy on a path of sustained economic growth. The Government aims to promote various initiatives to develop a more diversified and service oriented economy, to involve all stakeholders in the development thrust, to strengthen the operations of central government, and to eradicate poverty among its citizenry.

Grenada subscribes to and has in fact signed onto the Millennium Development Goals and is fully committed to achieving the goals and targets by the 2015 benchmark date. Reducing the incidence of poverty by half by 2015 as well as achieving the other goals and targets is central on the development planning agenda.

Despite the ravages the hurricanes had and the impacts on the national economy measured by global events, the Government is fully committed to promote the achievement of the country's obligations on the regional and international levels. The overall strategies must be placed within the framework of the international economy. Globalization and liberalization characterized the international economic order. To quote James (1999), "An increasingly globalised capitalist market and an intensified drive for the States to rely on "free competition" characterized the current economic order. If developing countries, like Grenada, are unable to improve their capacity to compete in this ever increasing globalization, they face increased poverty, unemployment and underdevelopment."

This means that Grenada must immediately identify the activities for which it has a competitive advantage. These activities should be able to generate high income, stimulate growth and enable the Government to implement its poverty eradication strategies. Globalization presents both challenges and opportunities.

The challenges include: the need to create a highly literate and productive labour force which is

efficient and effective; to harness the energy and will of Grenadians to ensure that they build their social capital and commit themselves to the national development plan, and to improve social conditions and at the same time achieve economic growth.

Grenada's Poverty Eradication Strategy focuses on the following priority elements:

- Economic recovery for sustained robust economic growth;
- Agriculture rehabilitation and development
- Housing development;
- Reduced unemployment;
- Improved access to social infrastructure;
- Human resources development;
- Modernization of estate service machinery;
- Improved environmental management;
- Social safety net programmes.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.5. サモア

Samoa

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Samoa is particularly vulnerable to the adverse impacts of climate change. Its land, livelihoods, culture and ecosystems are fundamentally threatened by sea level rise and the changing climatic conditions.

Adaptation measures are identified in the areas of water resources, health, agriculture, fisheries, biodiversity and infrastructure. Mitigation opportunities exists in the expansion its hydropower generation capacity, while vehicle fuel-efficiency improvements and demand-side energy efficiency.

2. Summary on climate change related issues in the country

- **Climate change policy**

Samoa ratified the United Nations Framework Convention on Climate Change (UNFCCC) in November 1994, and ratified the Kyoto Protocol in November 2000. Samoa submitted its initial national communication under the UNFCCC in October 1999, and its second national communication in June 2010. National adaptation programme of action was submitted in December 2005.

The Samoan Cabinet approved the National Climate Change Policy in early 2008, providing "a national framework to mitigate the effects of climate change and adapt to its impacts in an effective and sustainable manner." With respect to mitigation, the policy includes a general commitment to promote mitigation in all sectors. Other highlighted mitigation strategies include Samoa's becoming involved in carbon trading and clean development mechanism projects, promoting energy efficiency and renewable energy and providing financial incentives for mitigation.

- **National efforts / measures against climate change**

The Ministry or Natural Resources and Environment (MNRE) is the agency responsible for the overall implementation of Samoa's adaptation and mitigation activities. The MNRE also plays a major role in developing strategies, policies and coordinating adaptation measures.

The Ministry of Finance is the designated national authority of PNG, and Samoa does not have registered CDM projects or projects under validation.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

In 2007 Samoa's GHG emissions totalled approximately 352,034 tonnes of CO2-equivalent (tCO2-e). The GHG inventory also estimated CO2 removals in forests and on croplands, which totalled -785,067 tonnes in 2007.

Table 1: Samoa's overall GHG emissions and removals (2007).

Sector	CO2 tonnes	CH4 tonnes	N2O tonnes	HFCs t CO2-e	Equiv. CO2 Emissions t CO2-e	CO2 Removals Tonnes
Energy	170,981	50	7.5	-	174,350	-
Industrial Processes & Product Use	4,138	-	0.4	5,253	9,507	-
Agriculture, Forestry & Other Land Use	4.55	4,207	152	-	135,366	-785,067
Waste	2,409	1,422	2	-	32,811	-
TOTAL	**177,533**	**5,679**	**161**	**5,253**	**352,034**	**-785,067**

As shown in the table below, the results of the GHG inventory confirm that 95% of Samoa's emissions come from just six sources.

Table 2: Top six sources of GHG emissions in Samoa (2007).

Rank	Source	Emissions (t CO2-e)	% of total emissions
1	Road Transport	95,105	27%
2	Livestock Farming	88,357	25%
4	N2O from Agricultural Soils	47,005	13%
3	Electricity Generation	44,214	13%
5	Other Energy Consumption	34,141	10%
6	Wastewater	25,438	7%
	TOTAL	**335,150**	**95%**

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Samoa has not submitted its NAMA plan.

- **Mitigation Options**

The table below contains a summary of the mitigation opportunities that are available to Samoa. Thus far, Samoa's most promising mitigation option is to expand its hydropower generation capacity, while vehicle fuel-efficiency improvements and demand-side energy efficiency also hold significant potential.

Table 3: Summary of additional mitigation opportunities and associated GHG savings

Additional Mitigation Opportunities	Potential GHG Savings in 2020 (t CO2-e pa)
Energy Efficiency - Demand-side management	230-1,380
Renewable Energy: Expanded hydropower capacity Wind power	 33,050 992
Transport - Fuel Efficiency Improvements	6,617
Forests: Avoided deforestation Reforestation	 Not quantified Not quantified
Waste: Organic waste recycling Phase out of open burning	 Not quantified Not quantified

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

Samoa's GHG Inventory indicates that its GHG emissions are relatively very small. This, however, does not imply that it will not be adversely affected by the impact of climate change.

Water supply and quality

Water resources and water supply systems are extremely vulnerable to current climatic patterns. Periodic droughts associated with El Niño-Southern Oscillation events meant that Samoa's water supply was rationed and water reservoirs were depleted.

Extreme heavy rainfall causes immediate flooding, which in turns causes extensive erosion, loss of terrestrial habitats, damage to agro-forestry and destruction to vital infrastructure. The influx of flood-mobilised sediments into reservoirs and hydropower schemes damages the water supply as it compromises the generation of electricity. An increase in diesel power generation is recognised as a result of faltering or unsuitable supplies for hydropower.

Incidents of underground water becoming saline have been reported in parts of northern and eastern Savai'i. Although the current rate of sea level rise has a slight effect on watershed and aquifers, several coastal springs are becoming inundated by what communities view as rising sea levels.

Health

The effect of climate change upon the health sector is evidenced in the growth of vector-and water-borne diseases. Other projected health issues are the result of changes in ecological and social systems, namely changes in local food production, potential malnutrition from successive agricultural under-production, population displacement and stresses caused by economic disruption.

Samoa is susceptible to extreme climate events such as cyclones, flooding and droughts and water and food-borne diseases such as typhoid, diarrhoea and gastroenteritis remain highly prevalent. Vector-borne diseases including dengue and filariasis continue to receive highest priority in terms of control and prevention programmes.

Agriculture and food production

The numerous effects of climate change and variability: cyclones, flash floods, high rainfall, high temperature and long dry periods have made agricultural production increasingly challenging. Climatic changes have meant greater incidence of pests and pestilence, which meant a loss of quality and quantity in production.

Fisheries

All components of fisheries (oceanic fisheries, coastal fisheries and aquaculture) show very high vulnerability to climate change.

Because it can alter environmental conditions relevant to productivity and habitats for pelagic species, sea surface temperature (SST) is critical to both the coastal and oceanic sectors in the immediate to long-term. For aquaculture, rising SST threatens broad stock like giant claims, as water temperatures exceed normal tolerance levels.

Extreme winds affect all components of fisheries. For oceanic and aquaculture fisheries, infrastructure becomes more vulnerable as fishing vessels smash into each other at berth and alongside the wharf and the hatchery required for spawning is damaged or destroyed by flying objects and fallen trees.

The Coastal and Aquaculture component of Fisheries is also vulnerable to extreme rainfall as run-off from land affects the coastal marine environment. Extreme wave action is projected to have a devastating effect on coastal fishery and aquaculture. Wave action is also important for the oceanic component of fishery, as it can significantly reduce catches.

Biodiversity

Many changes are anticipated for the biodiversity sector as a result of climate change, not only in terms of species population but also in terms of the health of entire ecosystems. The health of the biodiversity sector has direct consequences for inter-related sectors, namely fisheries, forestry, agriculture, tourism, infrastructure, health and water.

Infrastructure

Samoa's coastline is highly susceptible to erosion and flooding. More than three quarters of Samoa's population resides along the coastal planes, which indicates to some degree Samoans' strong reliance upon marine resources for subsistence and commerce. Infrastructure and utility services are also located in these coastal zones and are thus extremely vulnerable to extreme climate events.

Tourism is a major economic sector in Samoa, and most tourism spots are located within coastal areas. The effects of climate change and climate variability have been widely acknowledged as

both direct and indirect. Direct effects include the loss of beaches, inundation and degradation of coastal ecosystems, saline intrusion and damage to critical infrastructures. Indirect consequences include the diminished beauty of natural resources, for example bleached coral or destroyed forests.

- **Summary of National Adaptation Programme of Action (NAPA)**

The Samoa NAPA Vision is:
To achieve a high level of community capacity for adaptation to adverse impacts of climate change

The NAPA aims to communicate urgent and immediate adaptation needs and the activities to address these needs to deal with the adverse impacts of climate change; and to develop the strategies for capacity building amongst stakeholders and village communities.

The main objectives of Samoa's NAPA are:
1. To develop and implement immediate and urgent project based activities to adapt to climate change and climate variability;
2. To protect life and livelihoods of the people, infrastructure and environment;
3. To incorporate adaptation measures and goals into national and sectoral policies, and development goals; and
4. To increase awareness of climate change impacts and adaptation activities in communities, civil society and government.

- **Adaptation Options**

Table 4: Immediate & Urgent Adaptation Activities in Ranking Order

Rank	Project Profile Name	Activities
1	Securing Community Water Resource	• Develop water purification programs for communities • Develop watershed management programme for (other) communities • Alternative water storage programs • Restoration of coastal springs in communities
2	Reforestation, Rehabilitation & Community Forestry Fire Prevention	• Reforestation & Rehabilitation (sustainable forest management) • Forest Fire Prevention Program
3	Climate Health Cooperation Program	• Establish Climate-Health Cooperation Program
4	Climate Early Warning System	• Develop Climate Early Warning System and Emergency Measures
5	Agriculture & Food Security Sustainability	• Investment on annual crops and home vegetable farming • Alternative Farming Systems
6	Zoning & Strategic Management Planning	• Zoning, Disaster Planning & Urban Planning • Strengthening building codes resilient to cyclones

7	Implement Coastal Infrastructure Management Plans for Highly Vulnerable District	• Implement Coastal Zone Management • Coastal infrastructure protection (seawall) • Construction of seawalls (subject to existing plans and code) • Assistance for relocation of roads further inland • Assistance for relocation of communities inland
8	Establishing Conservation Programs in Highly Vulnerable Marine & Terrestrial Areas of Communities	• Conservation Areas • Establish Marine Reserves • Marine & Terrestrial Conservation Areas (e.g.MPAs)
9	Sustainable Tourism Adaptation	• Sustainable Tourism – to develop Tourism Environmental Policy

5. Key industries and economic activities

The economy of Samoa has traditionally been dependent on development aid, family remittances from overseas, agriculture, and fishing. The country is vulnerable to devastating storms. Agriculture employs two-thirds of the labour force and furnishes 90% of exports, featuring coconut cream, coconut oil, and copra. The manufacturing sector mainly processes agricultural products. One factory in the Foreign Trade Zone employs 3,000 people to make automobile electrical harnesses for an assembly plant in Australia. Tourism is an expanding sector accounting for 25% of GDP; 122,000 tourists visited the islands in 2007.

In late September 2009, an earthquake and the resulting tsunami severely damaged Samoa, and nearby American Samoa, disrupting transportation and power generation, and resulting in about 200 deaths. The Samoan Government has called for deregulation of the financial sector, encouragement of investment, and continued fiscal discipline, while at the same time protecting the environment. Observers point to the flexibility of the labour market as a basic strength for future economic advances. Foreign reserves are in a relatively healthy state, the external debt is stable, and inflation is low.

6. National development strategy

Strategy for the Development of Samoa (SDS) is Samoa's main planning document, outlining a five-year programme for national development. The Vision for the 2008-2012 SDS expresses the aspirations of the Samoan people: *Improved Quality of Life for All*

The achievement of the vision relies on realising the seven national development goals of SDS 2008–2012, which in turn requires effective implementation of development strategies in the three priority areas of economic policies, social policies and public sector management and environmental sustainability. The goals are:

Priority Area 1: Economic Policies

- Goal 1: Sustained Macroeconomic Stability
- Goal 2: Private Sector Led Economic Growth and Employment Creation

Priority Area 2: Social Policies

- Goal 3: Improved Education Outcomes
- Goal 4: Improved Health Outcomes
- Goal 5: Community Development: Improved Economic and Social Wellbeing and Improved Village Governance

Priority Area 3: Public Sector Management and Environmental Sustainability

- Goal 6: Improved Governance
- Goal 7: Environmental Sustainability and Disaster Risk Reduction.

The SDS includes a number of activities that are relevant to climate change mitigation. This includes a commitment to "make significant greenhouse gas reductions," to be achieved through "renewable energy use, energy efficiencies, sustainable transport and public awareness of the importance of greenhouse gas abatement"

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.6. ジャマイカ

Jamaica

1. Mainstreaming adaptation / mitigation actions in the national development strategy

As a low-lying island state Jamaica is vulnerable to a number of climate change impacts. Jamaica, in its Second National Communication (SNC) to the United Nations Framework Convention on Climate Change (UNFCCC), discusses a number of primary vulnerabilities including: (i) reduced quality of coastal aquifers and water supplies, (ii) urban and semi-urban areas vulnerable to sea level rise, (iii) agricultural productivity in main export crops, (iv) disasters including increased frequency of inundation events and coastal degradation, and (v) increased incidence of disease vectors.

On the other hand, Jamaica is still a developing country and the resources it has to combat these vulnerabilities are limited in a business as usual scenario. Therefore developing prioritized mitigation actions by feasibility and adaptation actions by sector is an essential step in Jamaica's long-term climate change planning. In this regard, as concerns mitigation, the SNC has identified actions in transport, energy, agriculture/forestry, and waste management as priority mitigation measures. As concerns adaptation, the SNC defines water resources, agriculture, human health, coastal zones and human settlements, and tourism as the primary sector framework for Jamaica's response.

2. Summary on climate change related issues in the country

- **Climate change policy**

Jamaica ratified the UNFCCC on 6 January 1995 and the Kyoto Protocol on 28 June 1999. Jamaica submitted their first National Communications Report in 2000 and Second National Communications Report in 2011.

There are two principle policies addressing climate change in Jamaica:

Vision 2030 Jamaica: National Development Plan provides the overarching context within which Jamaica's mitigation activities will take place. It includes two national strategies – Develop measures to adapt to climate change and Contribute to the effort to reduce the global rate of climate change – that specifically speak to the strategies and actions that Jamaica will employ to reduce its greenhouse gas (GHG) emissions to 2030. Vision 2030 articulates that "mitigation, through reducing GHG emissions, will be addressed through greater energy conservation". Energy conservation in Jamaica will beget a "win-win" situation as it provides other substantial positive economic, social and environmental co-benefits. As described in the National Outcome 10 of the Plan, energy conservation efforts, use of cleaner technologies and development of alternate energy will result in lower spending on imported oil, less pollution and reduction in pollution-related illnesses. Jamaica is planning to engage in reforestation to increase the

amount of greenhouse gases removed from the atmosphere, provide improved watersheds and waterways and reduce landslides and soil erosion.

National Energy Policy 2009-30 In December 2009, the government tabled a National Energy Policy 2009-30 in Parliament that will lead to the development of a: "a modern, efficient, diversified and environmentally sustainable energy sector providing affordable and accessible energy supplies with long-term energy security and supported by informed public behaviour on energy issues and an appropriate policy, regulatory and institutional framework."

This vision will be realized by translating the policy into strategies and specific areas of action, such as diversification of the country's existing fuel sources, development of renewable sources of energy, biofuels, and waste-to-energy programmes, to name a few. These strategies and actions are being administered through the corporate and operational plans in a range of organizations, starting with the Ministry of Energy and Mining (MEM) and its agencies, and also including other Ministries, agencies and departments such as those ministries with responsibilities for transport, agriculture, and environment.

The policy places priority attention on seven key areas:

- Security of energy supply through diversification of fuels as well as development of renewable energy sources;
- Modernizing the country's energy infrastructure;
- Development of renewable energy sources such as solar and hydro;
- Energy security and efficiency;
- Development of a comprehensive governance/regulatory framework;
- Enabling government ministries, departments and agencies to be model/leader for the rest of society in terms of energy management; and
- Eco-efficiency in industries.

Each of these seven priority areas, when implemented, are predicted to reduce Jamaica's GHG emissions and they have been included in the scenarios in Jamaica's mitigation assessment.

Other policies to be developed that will also help in the reduction of GHG emissions include the Renewable Energy Policy, the Biofuels Policy, and the Energy Conservation and Efficiency (ECE) protocol for the management and use of energy in the public sector. The ECE protocol concerns the operation of public sector facilities and entities.

- **National efforts / measures against climate change**

As regards the Kyoto Protocol, the Office of the Prime Minister is the designated national authority (DNA) for CDM. To date, Jamaica has 4 CDM projects, of which one is one of which is multiple countries Programmatic CDM projects under validation. The project aims to replace the existing and predominant use of kerosene-based lighting with purpose-designed LED/CFL lamps in the household. There are two wind farm projects that has been registered and issued. CERs that has been generated to date is nearly 259,000 ton.

Beyond the immediate application of the Kyoto Protocol, Jamaica has undertaken a number of climate change countermeasures on a national basis. Policy and technology options currently under consideration include:

(1) Natural gas technology for electricity production, especially for the bauxite alumina industries;
(2) Methane extraction from waste landfills for electricity production;
(3) Alternative fuels and vehicles, particularly CNG and diesel
(4) Renewable energy technologies including wind, small-scale hydro, cogeneration and biomass, solar, and Ocean Thermal Energy Conversion

Notably, as part of a capacity building activity, a number of baseline studies were conducted to obtain a better understanding of the level of education and understanding about climate change of Jamaican citizens, including:

- An in house focal point workshop on the Jamaica Phase Two "Top Up" activities: The purpose of the workshop was to sensitize the relevant persons within the Meteorological Service to the project and the possible outputs;
- A project launch workshop: The objectives of this workshop were to: 1) aid in reconvening the National Implementation Coordinating Unit for climate change in Jamaica and 2) launch phase two by informing participants about climate change, regional concerns, climate change scenarios, and alternative energy options for Jamaica;
- A Climate Change Symposium: Participants were sensitised to international issues related to climate change, particularly the 10th Conference of Parties of the UNFCCC and the effect that climate change could have on energy, water resources, coastal resources and biodiversity; and
- A climate change public education and awareness survey.

In Phase 2 of this project Jamaica sought to identify preliminary areas for the design of the Jamaica's Second National Communication to the UNFCCC. The identification of future capacity needs as they relate to climate change was also a critical component of the project.

Overall, the activities aided in facilitating national networks on climate change and promoting the integration of climate change concerns into the national development planning dialogue.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

The gases included in the GHG inventory are the direct GHGs, namely: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6), and the indirect GHGs (which contribute to Tropospheric ozone formation): non-methane volatile organic compounds (NMVOCs), carbon monoxide (CO), nitrogen oxides (NOx), and sulphur dioxide (SO_2).

The GHG evaluation years for the Initial National Communication (INC) were from 1994-2000. For the Second National Communication (SNC), the base years were from 2000-2005.

In the SNC, inventories were compiled for the years 2000 to 2005 for the following four sectors:

- Energy;
- Industrial Processes and Product Use;
- Agriculture, Forestry and Other Land Use (AFOLU); and
- Waste.

Trends from 2000-2005

Carbon dioxide emissions increased consistently from 9,531 Gg in 2000 to 13,956 Gg in 2005, apart from a slight dip in 2004. There was a similar trend for methane emissions, which rose from 31.1 Gg in 2000 to 41.9 Gg in 2005. Nitrous oxide emissions trended up, but in much smaller quantities.

The large increase (46%) in carbon dioxide emissions was due to increases in energy sector fuel consumption in the manufacturing (bauxite and alumina industry) and transportation categories. There was little change in the magnitudes of the sources and sinks for carbon dioxide in the Agriculture, Forestry and Other Land Use sectors over 2000-05. In the Industrial Processes and Products Use Sector, carbon dioxide emissions from the cement industry increased over 2000-05, but those due to lime manufacture declined. Imported lime was required to meet the alumina industry demands. Carbon dioxide emissions in the waste sector increased over 2000-05, but the contribution from managed disposal sites decreased while that from unmanaged sites increased. There was a similar pattern for methane emissions in the waste sector with those from managed sites decreasing and those from unmanaged sites increasing.

The table below summarizes Jamaica's GHG Emissions in 2000.

Table 1: GHG Emissions by Sector (Gg)

Greenhouse gas source and sink categories	Net CO2 Emissions Gg	CH4 (Gg)	N2O (Gg)	CO (Gg)	NOX (Gg)	NMVOC (Gg)	SO2 (Gg)
Total National Emissions and Removals	9,532.0	31.7	9.9	191.0	34.0	23.9	173.0
1 ENERGY	10,066.0	3.8	1.2	191	34.0	20.0	171.0
2 INDUSTRIAL PROCESSES AND PRODUCT USE	537.0	0.0	0.0	0.0	0.0	0.0	0.0
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	-1,108.0	8.8	8.3	0.0	0.0	0.0	0.0
4 WASTE	36.3	0.6	0.1	0.3	0.0	3.9	1.4
5 OTHER	0.0	0.0	0.2	0.0	0.0	0.0	0.0

Note: rounding errors account for discrepancy in totals.
Source: Government of Jamaica (2011). *Second National Communication of Jamaica to the UNFCCC.*

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Jamaica has not submitted its NAMA plan. However, the SNC notes a number of programmes containing measures to mitigate climate change in addition to the two national policies (*Vision 2030 Jamaica* and the *National Energy Policy 2009-30*) mentioned in Section 2, above. These include:

(1) National Transport Policy: drafted in 2007, the policy will encourage more efficient modes of transport such as barges especially for bulky materials like aggregates. The possibility of enhanced coastal and rail transport will be kept under constant review. The policy foresees that once natural gas is introduced into Jamaica's energy supply mix, the transport fleets, where applicable, will be converted to CNG. In the longer term, a CNG supply network will be developed to enable private motorists to convert to natural gas based motor vehicles.

(2) Strategic Forest Management Plan: 2009-13: from the Forestry Department, has a specific mandate to maintain and measure the role of forests as carbon sinks as part of Jamaica's commitments under the UNFCCC.

(3) Draft Carbon Emissions Trading Policy 2009: sets out a comprehensive framework for Jamaica's participation in the carbon trading market. It presents the Government's positions, defines investment priorities, establishes the institutional and legal framework, and facilitates structures necessary for the effective management of the regime involving the participation of all sectors in a manner that is mutually beneficial to all. The overarching objective is to position Jamaica to capitalize further on opportunities for partnerships with other developed countries, private organizations, as well as relevant regional or international institutions. This will generate social, economic and environmental benefits for the country through investment in initiatives that will also foster sustainable development goals.

(4) Regulatory Policy for the Addition of New Generating Capacity to the Public Electricity Supply System: is set up to guide the addition of new generating capacity to the Jamaican electricity grid. The policy was drafted as part of the government's goal of enabling national government entities to become more efficient in their operations, generating significant cost savings while eliminating or minimizing adverse impacts on the environment. The policy speaks to among other things, energy conservation, water conservation, and fleet management – aspects of government operations that have an impact on the overall use of energy.

- **Mitigation Options**

Vision 2030 provides the context and goals for national development and the National Energy Policy 2009-30 provides the framework within which the mitigation measures will take place. The Energy Policy presents a range of options and strategies for energy conservation to which the government is committed to pursue over the short, medium and longer term. It also identifies fuel diversification (with explicit targets) among the key goals to improve energy security and reduce energy costs.

These two policies place a high priority on diversifying the country's energy mix and increasing the percentage contributed by renewables. The Energy Policy in particular envisages that the supply mix will have marked changes by 2012 when petroleum is expected to represent 67 percent of the mix, natural gas 15 percent, petcoke/coal 5 percent and renewables 12.5 percent. By 2030, the share of petroleum in the supply mix is expected to be only 30 percent, with natural gas accounting for as much as 42 percent of the mix and renewables 20 percent.

Some of the specific strategies included in the Energy Policy that will facilitate mitigation measures are as follows.

- finalizing the energy efficiency and conservation policy;
- creating relevant legislation to support required investments in energy efficiency;
- infusing energy conservation issues into relevant sectoral policy development (e.g. tourism, health, and water policies);
- implementing a public education programme to encourage energy conservation;
- providing incentives/disincentives for the use of innovative/clean technologies in power
- generation, mining, and manufacturing to improve energy efficiencies;
- promulgating the energy efficient building code;
- introducing national vehicle emission standards;
- promoting greater vehicle fuel efficiency;
- promoting imports of more fuel efficient vehicles;
- levying taxes on petrol at appropriate levels to encourage conservation;
- providing adequate infrastructure for transition to alternative energy vehicles;
- improving infrastructure and enforcing maximum axel weight standards;
- increasing mass transit opportunities and utilization; and
- introducing financial incentives for solar technologies in the public and private sectors.

Centre for Renewable Energy (CERE) will also facilitate private sector involvement to implement projects in the areas of hydropower, wind, solar, biomass, and waste-to-energy.

4. Adaptation and Vulnerability

● Vulnerability to climate change

Vulnerability and adaptation assessments were undertaken for five sectors: water resources, agriculture, human health, coastal zones and human settlements, and tourism.

Water Resources

Initial analysis of the Kingston Metropolitan Region, including the communities in Southeastern St. Catherine, indicates that increased abstraction in the upper Rio Cobre basin could be the main cause of lower water supplies and not so much as a direct result of less rainfall. The Hope River—another major source of water resources—is likely to decline by 11 percent by 2030. Significant issues associated with water resources management and vulnerability and the impacts of climate change are likely to present some pressure.

Agriculture

Already there are signs of significant vulnerability of the sector to climate variability (e.g., storms and droughts). In September 2004, Hurricane Ivan destroyed the entire domestic and export crop resulting in 8,000 persons being out of work. Forty-five percent of coffee berries were lost and sugar cane was uprooted, resulting in reduced sugar content and yield. Livestock was also affected as milk production decreased due to the death of animals. Studies from elsewhere indicate that vulnerability will increase in the future with climate change. However, it is difficult to determine the impact of climate change on agriculture and develop appropriate adaptation measures without the appropriate tools and approaches.

Human Health

With global warming, human well-being will be affected by droughts and higher temperatures either directly or indirectly.

Coastal Resources and Human Settlements

The impacts of these processes on the various kinds of coastline around Jamaica were assessed. On beaches, short term erosion is largely governed by the incidence of storms. Over longer periods, sea level rise will cause progressive retreat. Hard engineered structures such as sea-walls will probably lead to eventual disappearance of any beaches in front of them. Offshore breakwaters will be more useful in retaining near-shore sand supplies. On cliffs and rocky coasts, sea-level rise will bring the cliff top closer to sea-level and increase the frequency of overtopping of the cliff by storm waves and rock debris, including large boulders. Recession will be greatest for soft-rock cliffs, whereas fractured hard rock cliffs will be more prone to sudden collapse, as indicated in the included Jamaican examples. Wetlands present a particular problem due to their proximity to sea-level and the micro-tidal regime around Jamaica. Small changes in sea-level will prompt progressive retreat and migration of wetland eco-zones, unless vertical accumulation rates of wetland debris keep up with sea-level rise. Most Jamaican wetlands are fronted by a narrow beach which will retreat over the wetland, driven by storms and sealevel rise. No data on the vertical accumulation rate of wetland sediments is available for Jamaica.

Tourism

Two socio-economic scenarios were modelled; one without climate change variables (control scenario) and another with assumptions about a changed climate change. An independent model was also developed to examine visitor arrivals over time.

For the control scenario, visitor arrivals are expected to increase to 3.1 million by 2050. For the scenario with a changing climate, the number of visitors falls to 2.7 million by 2050, resulting in declines in earnings.

- **Summary of National Adaptation Programme of Action (NAPA)**

Jamaica has not submitted a NAPA. However, given the variety of possible adaptation measures, the SNC segments the adaptation response by sector by alluding to an adaptation strategy under the sectors of water resources, agriculture, human health, coastal zones and human settlements, and tourism.

- **Adaptation Options**

Proposed Elements of a Water Resources Adaptation Strategy for Jamaica

- Increasing and maintaining investment in hydrological monitoring and water use through a national database. This will result in improved data collection and storage on a national scale.
- Funding research into adopting a water resources and water supply planning method under climate change. With appropriate methods in place, consistent regional and national planning can take place under a changing climate.
- Developing appropriate modelling tools to assist strategic planning of water resources. There is an urgent need to develop a consistent set of appropriate modelling approaches and tools.
- Investigate shifting focus from ground water to surface water storage for water supply. Reducing the reliance on vulnerable coastal aquifers, in terms of quality and quantity with the increased use of surface water reservoirs to maintain supplies.

Proposed Elements of an Agriculture Adaptation Strategy for Jamaica

- Raise awareness of the potential impact of climate change on the agricultural sector. Climate change is not mentioned in the Agricultural Development Strategy 2005-2008.
- Develop modelling approaches and tools to allow assessment of impacts of climate change on export and domestic crops and meat production. Detailed crop/country/climate specific assessments are required to inform an adaptation programme and policy development.
- Develop regional links to fund and promote plant breeding programmes for common crops.
- Adaptation strategies include the development of crop varieties with increased temperature, drought and pest resistance.
- Review approaches to integrated pest management under climate change. Existing pest management strategies may require modification under climate change. Care must be taken that any changes to these strategies do not have negative impacts on the environment, for example, from increased pesticide use.

Proposed Elements of an Health Adaptation Strategy for Jamaica

Short-term adaptation strategies for addressing vector-borne diseases include:

- Public education aimed at encouraging individuals to identify and eliminate current breeding sites and the symptoms of dengue;
- Surveillance in outbreak communities for the purpose of environmental sanitisation; and
- Adult mosquito control through the use of appropriate insecticide.

Overall recommendations for the health sector include:

- Public education in the management of stress;
- Elimination of taxes on electric fans;
- Increased public education in the areas of sanitation and food poisoning;
- Relevant agencies prepared for handling increases in the incidents of food poisoning;
- Public health inspections for mosquitoes, including pest and rodent eradication;
- Sustainable design standards for housing in areas subjected to high rainfall and hurricane winds, for example, roofs can reduce heat absorption by painting them white or silver; windows need cross ventilation; and
- More attention to be paid to the design of settlements.

Priority should be given to:

- Better water monitoring and management through improvements at the National Water Commission and Water Resources Authority;
- Improving the capabilities of ODPEM to warn of hazards;
- Improving data gathering ability and technical support staff of the Meteorological Office for monitoring and warning of air-boned type diseases;
- More collaboration between research institutions involved in pollution control;
- All available climate data from sources are to be used to validate regional models and calibrate statistical models;
- Support should be given to research institutions involved in environmental related health risks to run as many regional and statistical downscaling models as possible for calibration and intercomparison purposes;
- Safe water storage drums; and
- More proactive actions in pressing the case for mitigation of greenhouse gases, especially by the developed countries, in order to prevent increased temperatures.

Proposed Elements of an Coastal Zones & Human Settlements Adaptation Strategy for Jamaica

The most important measure for adapting to sea-level rise involves a thorough revision of the present published setback guidelines. Instead of being based on slope angles, these should be related to the local risk of inundation from present and future storm events (i.e., site specific). Setbacks for structures on rocky coasts where there is storm-deposited debris should be determined by the position of the debris ridge formed by sandy and rocky debris accumulated over the past four millennia. Destroying this ridge for construction materials exposes communities and buildings behind the ridge to increased vulnerability from inundation and damage from moving debris.

Proposed Elements of a Tourism Adaptation Strategy for Jamaica

- Raise stakeholder awareness of the workings of both tourism and environment;
- Stakeholder identification of detailed programme and projects;
- Set up a comprehensive performance framework with targets;
- Provide more varied visitor attractions to a) put less pressure on existing natural resources and b) stimulate more visitors;
- Reflect social and environmental costs in the price of tourism products;
- Improve environmental lobbying;
- Implement infrastructural changes to protect the environment, e.g., groynes and levees, reforestation, and coastal zone management;
- Implement education and sensitisation programmes;
- Intensify community tourism activities; and
- Increase urban tourism.

5. Key industries and economic activities

The Jamaican economy is heavily dependent on services, which now account for nearly 65% of GDP. The country continues to derive most of its foreign exchange from tourism, remittances,

and bauxite/alumina. Remittances account for nearly 15% of GDP and exports of bauxite and alumina make up about 10%. The bauxite/alumina sector was most affected by the global downturn while the tourism industry was resilient, experiencing an increase of 4% in tourist arrivals. Tourism revenues account for roughly 10% of GDP, and both arrivals and revenues grew in 2010, up 4% and 6% respectively. Jamaica's economy faces many challenges to growth: high crime and corruption, large-scale unemployment and underemployment, and a debt-to-GDP ratio of more than 120%.

Jamaica's onerous public debt burden is the result of government bailouts to ailing sectors of the economy, most notably to the financial sector in the mid-to-late 1990s. In early 2010, the Jamaican government created the Jamaica Debt Exchange in order to retire high-priced domestic bonds and significantly reduce annual debt servicing. The Government of Jamaica signed a $1.27 billion, 27-month Standby Agreement with the International Monetary Fund for balance of payment support in February 2010. Other multilaterals have also provided millions of dollars in loans and grants. Despite the improvement, debt servicing costs still hinder the government's ability to spend on infrastructure and social programs, particularly as job losses rise in a shrinking economy.

The Simpson-Miller administration faces the difficult prospect of having to achieve fiscal discipline in order to maintain debt payments, while simultaneously attacking a serious crime problem that is hampering economic growth. High unemployment exacerbates the crime problem, including gang violence that is fuelled by the drug trade.

6. National development strategy

Jamaica’s overarching strategic direction that will guide the country’s development to 2030 is articulated in *Vision 2030 Jamaica: National Development Plan*, and is based on the comprehensive vision “Jamaica, the place of choice to live, work, raise families, and do business”. The plan is expected to result in Jamaica achieving developed country status by 2030. There are four national goals, 15 national outcomes, and over 50 national strategies to achieve them.

It is based on seven Guiding Principles which put people at the centre of Jamaica’s development. These are: transformational leadership; partnership; transparency and accountability; social cohesion; equity; sustainability; and urban and rural development. They give priority attention to elements that are essential to delivering a world-class quality of life for all Jamaicans and reflect the key pillars of change needed to realize the Vision for our nation.

Vision 2030 Jamaica is built on four strategic goals for the country’s development. These goals are mutually reinforcing and synergistic in design, and their achievement cannot be realized in isolation from each other. They give greater articulation to the vision statement and are the pillars on which the new paradigm for Jamaica’s sustainable prosperity rests.

Operationally, the four National Goals are mapped into 15 National Outcomes, which in turn will be pursued through National Strategies. The National Outcomes reflect the desired changes in

development conditions and, when accomplished, lead to the achievement of the National Goals. Each outcome is aligned to a specific goal, and collectively they provide the roadmap for achievement and success under Vision 2030 Jamaica.

National Goals	National Outcomes
1 Jamaicans are empowered to achieve their fullest potential	1: A Healthy and Stable Population 2: World-Class Education and Training 3: Effective Social Protection 4: Authentic and Transformational Culture
2 The Jamaican society is safe, cohesive and just	5: Security and Safety 6: Effective Governance
3 Jamaica's economy is prosperous	7: A Stable Macroeconomy 8: An Enabling Business Environment 9: Strong Economic Infrastructure 10 : Energy Security and Efficiency 11: A Technology-Enabled Society 12: Internationally Competitive Industry Structures • Agriculture • Manufacturing • Mining and Quarrying • Construction • Creative Industries • Sport • Information and Communications Technology • Services • Tourism
4 Jamaica has a healthy natural environment	13 : Sustainable Management and Use of Environmental and Natural Resources 14 : Hazard Risk Reduction and Adaptation to Climate Change 15 : Sustainable Urban and Rural Development

Source: SNC (2011)

Based on the National Outcomes defined in the table above, national strategies will be implemented through sector level programmes, plans and activities for each of the social, governance, economic and environmental sectors of the country. Vision 2030 Jamaica will be supported by seven three-year, medium-term socioeconomic policy framework (MTF) documents. The MTF 2009-2012 is the first such document, which focuses on six priority outcomes:

- Security and Safety
- A Stable Macro economy
- Strong Economic Infrastructure
- Energy Security and Efficiency
- World Class Education and Training
- Effective Governance

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.7. セントルシア

Saint Lucia

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Saint Lucia is characterized by unique island state circumstances that pose serious challenges to development in the context of climate change. These include such aspects as small size (land mass, population), an open economy with a negative balance of trade, a limited natural resources base, fragile ecosystems, limited human capacity and resources, and limited technological capability. Compounding this, climate change exposes Saint Lucia to increased frequency of natural hazards such as hurricanes and extreme hydrological events. It is the interplay of these vulnerabilities that require urgent actions towards climate change in Saint Lucia, particularly as concerns adaptation.

In this background, Saint Lucia has been developing a number of studies, policies, and a handful of concrete actions in regards to climate change with particular focus on adaptation, culminating in vulnerability assessment conducted as part of second national communication and the 2003 *Saint Lucia National Climate Change Policy and Adaptation Plan*.

1. Summary on climate change related issues in the country

- **Climate change policy**

Saint Lucia ratified the United Nations Convention on Climate Change (UNFCCC) on 14 June 1993 and the Kyoto Protocol on 20 August 2003.

As noted above, many of Saint Lucia's climate change actions and policies are couched within a broader development agenda or are guided by a number of national, regional and international policy imperatives and instruments. Although taken as a whole, Saint Lucia's climate change policies are comprehensive, the process has largely been iterative that has seen different government ministries and organizations adopt independent strategies and policies.

Saint Lucia is committed to achieving the Millennium Development Goals (MDGs), that also address combating greenhouse gases (GHGs). Saint Lucia is also committed to the implementation of the Barbados Programme of Action (BPoA) and the Mauritius Strategy. The BPoA, adopted at the first Global Conference on Sustainable Development of Small Island Developing States held in Barbados in 1994, sets forth specific actions and measures to be taken at the national, regional and international levels to support the sustainable development of Small Island Developing States (SIDS). The Mauritius Strategy was adopted at the International Meeting to Review the Implementation of the SIDS Programme of Action in Mauritius in 2005. Both documents underscore the particular vulnerability of SIDS in the face of climate change and outline specific response measures to be taken at national, regional and global levels.

CARICOM, to which Saint Lucia became a member in 1974, is currently finalizing a regional strategy on adaptation to climate change. Saint Luca is also member of the Organization of Eastern Caribbean States (OECS), established in 1981. Environmental management in the OECS is guided by the St. Georges Declaration of Principles for Environmental Sustainability (SGD), which was adopted in 2001 and revised in 2006. The overall aim of the SGD is to "Foster Equitable and Sustainable Improvement in the Quality of Life in the OECS Region". Principle 8 of the SGD seeks to "Address the Causes and Impacts of Climate Change".

At the national level, Saint Lucia has established an extensive policy framework to guide national action on a wide range of environmental and related issues. To address the formerly piecemeal approach of Saint Lucia's climate change policies, a Legal and Institutional Review of Environmental Management was commissioned in 2001 to guide future expansion and strengthening of the legal, policy and institutional arrangements for the climate change sector. In addition, some specific policy instruments of relevance to addressing climate change have been adopted. These include a National Environment Policy (NEP) and a National Environmental Management Strategy (NEMS). In 2001, Saint Lucia adopted a National Climate Change Policy and Plan which sets the stage for implementing an integrated response to the impacts of climate change. A Sustainable Energy Plan (SEP) was adopted in 2002 which, among other things, identifies a number of short and medium-term renewable energy targets.

Other relevant instruments include:

- National Environment Policy (NEP)/National Environment Management Strategy (NEMS) (both make reference to the implementation of Saint Lucia's Climate Change Policy).
- National Land Policy (approved in 2007; incorporates climate change considerations).
- National Water Policy (approved in 2004; also incorporates climate change considerations): A Water Resources Management Agency (WRMA) has been established within the Ministry of Agriculture, Lands, Forestry and Fisheries policy that should include (MALFF) to, inter alia, spearhead implementation of the Policy.
- Sustainable Energy Plan (approved in 2001).
- National Energy Policy (June 2010).
- Draft National Environmental Education Policy and Draft National Environmental Education Strategy.
- Draft Environmental Research Policy.
- National Climate Change Policy and Adaptation Plan (NCCPAP) formulated in 2001.
- Draft Revised Climate Change Adaptation Policy (2011).
- Draft Climate Change Public Education Strategy (2011).
- Environment Impact Assessment process (Climate change considerations are currently being added to the Physical Planning Act and Regulations, including the Drat EIA Regulations).
- Coastal Zone Management Policy and Strategy (Towards the Development of a Coastal Zone Management Strategy and Action Plan for Saint Lucia).
- Saint Lucia's Coastal Zone Management (CZM) in Saint Lucia: Policy, Guidelines and Selected Projects (2004).
- National Environmental Commission (established in 2007).
- Draft Environmental Management Bill.
- National Emergency Management Plan (this includes: Hazard Mitigation Policy (GOSL, 2006),

Disaster Management Policy Framework or Saint Lucia (GOSL, 200911) and Comprehensive Disaster Management Strategy (GOSL, 200912).

- Biodiversity-related policy documents.
- Forest-related policy documents (National Action Plan to Combat Desertification and Drought (SFA 2003 Project13), revised legislation (draft) for the Forestry Department, draft Saint Lucia Forest Policy of 200814, Strategic Planning for Watershed Management Activity (200715), Wildfire Management Plan (GOSL, 200816).
- Enhanced institutional arrangements to create a sustainable national communication process (Including the designation of national and Technical Focal Points for the UNFCC; appointment of an informal Climate change Team within the SDED, appointment of an SNC team etc.).

Regardless of this attempt to develop a more holistic approach, to date, Saint Lucia has promulgated no legislation to deal specifically with climate change. However, in 2001, Saint Lucia enacted the Montreal Protocol Act. At present, steps are being taken to revise the Electricity Supply Act, which addresses electricity generation, in order to, among other things, more effectively allow for the generation of electricity from renewable energy sources. Work is also underway on the development of an Environmental Management Act which is expected to include references to climate change. This Act was completed in 2008 utilising funds made available through the European Union Special Framework of Assistance for 2003 (SFA-2003). The Bill has been further revised under Phase 1 of the Pilot Programme for Climate Resilience (PPCR) with a view to ensuring that climate change considerations have been adequately addressed and is expected to be finalized in the near future.

- **National efforts / measures against climate change**

As regards the Kyoto Protocol, the Ministry of Physical Development, Environment and Housing is the designated national authority for Saint Lucia. Currently, there are no CDM projects in Saint Lucia.

Under the piecemeal policy regime, actual climate change countermeasures have been similarly diverse. Broadly, the initiatives fall under the use of environmentally friendly technology, capacity building/public awareness, and information gathering/utilization.

Several initiatives have been undertaken with regard to technology use. The Global Environmental Facility (GEF)-World Bank-funded Special Programme on Adaptation to Climate Change (SPACC) Project (2007-11), executed regionally by the Caribbean Community Climate Change Centre (CCCCC), focused on the implementation of select adaptation measures was designed to address climate change impacts on biodiversity and land degradation. The Strengthened Critical Coastal Infrastructure sub-component of the Project seeks to demonstrate the design and implementation of appropriate interventions to reinforce critical infrastructure to the effects of intensified hurricanes. The second sub-component focuses on the Sustainability of Water Resources and Supply and seeks to complement the national water supply programme by establishing adaptation measures that would result in increased resilience of surrounding coastal ecosystems to the impacts of climate change and variability.

Under the PPCR, the demonstrated success in the pilot of adaptation measures in these areas will be upscaled for national level implementation. Further, it has been recognised that improving the rate of adoption of Environmentally Sustainable Technologies (ESTs) will require a number of measures, none the least is the provision of policy measures, including incentives to promote the use of ESTs.

As regards capacity building, the work to date has been relatively sparse. Specific needs, options and priorities for capacity building to address climate change issues have been identified in reports such as the Initial National Communication (INC), the National Capacity Self Assessment (NCSA), the Climate Change Technology Needs Assessment (CCTNA). However, these still need to be acted upon.

Lastly, information gathering and use is considered to be an important aspect of Saint Lucia's climate change response, particularly as concerns adaptation planning such as flood mapping and long-term meteorological data. However, concrete initiatives have been lacking in this field as well.

2. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

The direct GHGs included are Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O) and partially fluorinated hydrocarbons (HFCs). Indirect GHGs that contribute to Tropospheric Ozone (O_3) formation, such as Non-Methane Volatile Organic Compounds (NMVOC), Carbon Monoxide (CO) and Nitrogen Oxides (NOx) were also included in the inventory.

Emissions related to fuel combustion from all sectors have been included within the Energy Sector. The primary fuels consumed in Saint Lucia and which lead to greenhouse gas emissions from the energy sector are imported liquid fuels, gasoline, jet kerosene, gas oil and fuel oil. In addition to these charcoal and firewood are also utilized for energy in the residential sector.

Of the fossil fuels imported and consumed in Saint Lucia, the greatest proportions of CO_2 emissions result from the combustion of Gas/Diesel Oil (59.5 % in 2000) used almost exclusively for thermal electricity production, and from Gasoline (34.6 % in 2000) mainly for vehicular road transport, but also for agriculture and fishing. Smaller amounts of CO_2 emissions also result from LPG use (5.3 %) in the residential and industrial sectors and from the use of kerosene and lubricants.

The Manufacturing and Industrial Sector in St. Lucia is relatively small as is its overall contribution to greenhouse gases assessed on a global scale. Substantial emissions are contributed by the Food and Beverage Industries and Road Paving with Asphalt. Some HFCs are also released through the consumption and use of halocarbons for air-conditioning and refrigeration. All emissions from this sector are classified as non-CO_2. Total emissions of non-methane volatile organic compounds (NMVOCs) Emissions for the Inventory year 2000 decreased approximately 10% from 1994 due to a decrease in the estimate of asphalt used for road paving.

There are no CO_2 emissions reported as being released from the agricultural sector in Saint Lucia, as emissions related to fuel combustion are reported in the energy sector. Emissions of significance to the sector are CH_4 emissions associated with animal livestock, and N_2O arising from fertilizer application to cultivated soils, excretion from animal grazing, from atmospheric deposition of NH_3 and NOx, and from leaching of agricultural soils.

The anthropogenic effects of managed forests and changes in land-use designation are important. Activities such as land clearing and timber harvesting, increase CO_2 emissions and increase photosynthesis. CO_2 emissions and removals from this sector derive primarily from carbon uptake due to regrowth in forests; from emissions from forest and grassland conversion due to burning and decay of biomass; and from carbon release from forest soils. From the data indications are that Saint Lucia's Land Use Change and Forestry Sector is still a net source of CO_2 emissions. Total CO_2 emissions have however experienced an almost 75% decrease from 1994 to 2000 (approximately 85 Gg emitted in 1994 as opposed to 21 Gg in 2000).

The most important gas (non-CO_2) produced in this source category, the waste sector, is methane (CH_4). The two major sources are solid waste disposal to land, and wastewater treatment. In addition to CH_4 solid waste disposal sites also produce CO_2 and non-methane volatile organic compounds (NMVOCs) in very small amounts. Indirect N_2O emissions also result from human sludge. No CO_2 emissions are released from the waste sector. Total methane emissions in 2000 were 7.3 Gg, an 8% increase from 1994 while N_2O emissions from waste handling were negligible.

The table below summarizes Saint Lucia's GHG Emissions in 2000.

Table 1: GHG Emissions by Sources (Gg)

Greenhouse gas source and sink categories	Net CO2 Emissions (Gg)	CH4 (Gg)	N2O (Gg)	CO (Gg)	NOX (Gg)	NMVOC (Gg)	SO2 (Gg)
Total National Emissions and Removals	368.8	7.9	0.1	14.4	2.0	5.9	0.1
1 ENERGY	347.7	0.1	0.0	13.8	1.98	2.6	0.1
2 INDUSTRIAL PROCESSES AND PRODUCT USE	0.0	0.0	0.0	0.0	0.0	1.8	0.0
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	21.2	0.5	0.1	0.6	0.0	0.0	0.0
4 WASTE	0.0	7.3	0.0	0.0	0.0	0.0	0.0
5 OTHER	0.0	0.0	0.0	0.0	0.0	1.6	0.0

Note: rounding errors account for discrepancy in totals.

Source: Government of Saint Lucia (2011). *Second National Communication on Climate Change for Saint Lucia.*

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Saint Lucia has not submitted its NAMA plan and the Second National Communication (SNC) does not note any significant mitigation actions until 2011.

- **Mitigation Options**

The SNC recommends a number of mitigation options for Saint Lucia, including:

- Waste reduction
- Refrigerants phase out
- Fiscal measures for industrial energy efficiency
- Reforestation program for marginally used agricultural lands
- Regulations to incentivise purchases of high efficiency vehicles
- Transportation demand management
- Auto-generation and co-generation technology
- Wind farms
- Improved energy efficiency of appliances and lighting
- Energy efficient building code
- Auditing for small hotels
- Solar water heating
- Landfill gas capture with energy generation
- Demand side management programme for electricity

3. Adaptation and Vulnerability

- **Vulnerability to climate change**

The Vulnerability and Adaptation (V&A) assessments conducted during the Second National Communications (SNC) highlighted the vulnerabilities of several sectors including; water resources; land resources; agriculture; coastal sector; marine resources; forest terrestrial resources; health; financial services; and critical infrastructure.

Agriculture and tourism, which are the key economic sectors (as well as all other sectors) are expected to be affected by all the anticipated impacts of climate change. In addition, the anticipated negative impacts on social and economic infrastructure such as housing, water, agriculture, ports, schools, hospitals, tourism plants, health services, communications, *inter alia*, are likely to cause major social and economic stresses which can be alleviated by appropriate and timely adaptation measures. Another noteworthy conclusion is that all the anticipated impacts are likely to trigger some form of hazard, which may result in a disaster. These impacts include coastal erosion, loss of near shore housing and critical infrastructure, damage to properties and threat to life and livelihoods associated with increases storm intensity, heat related health impacts, landslides, loss of agricultural production and biodiversity, forest fires and damage to forest ecosystems due to wind damage. Any response measure to be implemented will have cross-cutting, multi-sectoral impacts.

- **Summary of National Adaptation Programme of Action (NAPA)**

Saint Lucia has not submitted its NAPA. However, the adaptation needs and priorities of Saint Lucia are discussed in the country's *National Climate Change Adaptation Policy and Strategy* (2003) as well as its Initial and Second National Communication to the UNFCCC.

The aim of the *National Climate Change Adaptation Policy* is to foster and guide a national process of addressing the short, medium and long term effects of climate change in a coordinated, holistic and participatory manner in order to ensure that, to the greatest extent possible, the quality of life of the people of St. Lucia, and opportunities for sustainable development are not compromised.

The Objectives of this policy are to:

- Foster the development of processes, plans, strategies and approaches to:
  - (a) Avoid, minimise or adapt to the negative impacts of climate change on St. Lucia's natural environment including ecosystems, species, genetic resources, ecological processes, lands and water;
  - (b) Avoid, minimise or respond to the negative impacts of Climate Change on economic activities;
  - (c) Reduce or avoid damage to human settlements and infrastructure caused by Climate Change;
  - (d) Avoid or minimise the negative impact of climate change on human health;
  - (e) Improve knowledge and understanding of climate change issues in order to obtain broad-based support for, and participation in climate change activities;
  - (f) Conduct systematic research and observation on Climate Change related factors in order to improve forecasting and to supply the necessary planning and response measures
- Foster the development and application of appropriate legal and institutional systems and management mechanisms for planning for and responding to climate change;
- Foster the development of appropriate economic incentives to encourage public and private sector adaptation measures.

- **Adaptation Options**

The following summarises the *National Strategy for Adaptation to Climate Change*. As such, the Strategy is a direct derivative of the Climate Change Policy, and it is intended to serve as a blueprint for implementation of the Policy.

- **Coastal & Marine Resources:** Undertake review of existing coastal monitoring and data collection systems.
- **Human Settlements:** Develop adaptation plan for human settlements including zoning, defences, building codes etc.
- **Terrestrial Resources, Terrestrial Biodiversity& Agriculture:** Establish a system for improved monitoring and research of key terrestrial and agricultural processes and resources.
- **Freshwater resources:** Undertake inventory of freshwater resources and develop and

implement a National Water Resources Management Plan.

- **Tourism:** Improve/ develop regulatory framework with emphasis on enforcement.
- **Cross-cutting:** Development and implementation of an integrated, coordinated and sustained climate change education and awareness programme targeting all sectors and relevant interest groups.

In addition to the *National Strategy* document, the vulnerability and assessment exercise conducted under the SNC proposed an extensive list of potential adaptation strategies for vulnerable sectors in Saint Lucia. The actions recommended for adaptation to climate change impacts, can be summarised into six components:

- Adaptation interventions in economic, social and environment/ecosystems dimensions, paying particular attention to vulnerable communities, vulnerable groups and the private sector, in order to begin building resilience and demonstrating results.
- Enabling framework for implementation of interventions for resilience building to include multi-level governance approach: regional, national and community; to provide clear direction on how adaptation programmes can be incorporated into institutional frameworks, ministry operational plans and policies, supported by appropriate legislation and fiscal regimes.
- Provision for multi level research and systematic observation, at a regional level, with national level linkages, to develop baselines and scenarios for future impacts, as well adaptation options to address them, including the requisite technical and financial resources required for effective national level adaptation.
- Addressing information and data gaps that constrain capable practitioners in regional agencies, government departments and civil society from addressing vulnerabilities.
- Increasing education and awareness of publics on issues related to climate change and improving capacities to facilitate climate change adaptation.
- Monitoring and evaluation of programme activities for assessing, results for ongoing modifications and adjustments as needed.

4. Key industries and economic activities

The island nation has been able to attract foreign business and investment, especially in its offshore banking and tourism industries, with a surge in foreign direct investment in 2006, attributed to the construction of several tourism projects. Although crops such as bananas, mangos, and avocados continue to be grown for export, tourism provides Saint Lucia's main source of income and the industry is the island's biggest employer. Tourism is the main source of foreign exchange, although tourism sector revenues declined with the global economic downturn as US and European travel dropped in 2009. The manufacturing sector is the most diverse in the Eastern Caribbean area, and the government is trying to revitalize the banana industry, although recent hurricanes have caused exports to contract.

Saint Lucia is vulnerable to a variety of external shocks including volatile tourism receipts, natural disasters, and dependence on foreign oil. High public debt and high debt servicing obligations constrain the Anthony administration's ability to respond to adverse external shocks. Economic

fundamentals remain solid, even though unemployment needs to be reduced.

5. National development strategy

The country's strategic development objectives are outlined in its 5-year Medium Term Strategic Plans (MTSP). The period of the last MTSP was 2001-2006. Interventions described in the 2006 to 2010 Medium Term Economic Strategy (MTES) are aimed at removing bottlenecks that are endemic to the socio-economic and environmental conditions that provide the context of national sustainable development.

The thirteen Member States of the Caribbean Community and Common Market (CARICOM) and the five Associated Member States have agreed to a single vision for sustainable development which encompasses economic, social, environmental and governance dimensions, grouped into six broad elements:

- Self-sustaining economic growth based on strong international competitiveness, innovation, productivity, and flexibility of resource use;
- A full-employment economy that provides a decent standard of living and quality of life for all citizens; elimination of poverty; and provision of adequate opportunities for young people, constituting an alternative to emigration;
- Spatially equitable economic growth within the Community, having regard to the high growth potential of member states with relatively low per capita incomes and large resources of under-utilised land and labour;
- Social equity, social justice, social cohesion and personal security;
- Environmental protection and ecological sustainability; and
- Democratic, transparent and participatory governance.

At the level of the Organisation of Eastern Caribbean States (OECS), Member States agreed to a human development agenda with eight key elements:

- Reducing the levels of poverty;
- Substantially increasing the number and quality of jobs;
- Providing access to quality education for all;
- Improving access to and the delivery of health services;
- Sustaining an adequate stock of natural resources;
- Empowering disadvantaged groups, at the household, community, national and regional levels to take charge of their own lives;
- Developing sports and enhancing participation at the national and regional levels; and
- Strengthening the institutions and practices of good governance.

These development agendas embrace the sustainable development paradigm, seeking to meet key social and economic goals sustainably. Member States are expected to implement policies and measures to achieve these development goals.

At the national level, Government has approved a National Vision Plan which is a Sector Development Plan which represents, in broad terms, the development priorities for each of the

four main regions of the country. This plan is a broad-based land use plan developed to support the expansion of the tourism infrastructure, support some measure of environmental sustainability, expansion of housing and industry expansion.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.8. ソロモン諸島

Solomon Islands

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Solomon Islands is already vulnerable to extreme climatic events such as flooding associated with heavy rainfall and tropical cyclones and droughts associated with the El Nino phenomenon. These events have increased in frequency, intensity and duration, and may be exacerbated in the future by climate and sea-level change.

Adaptation actions were identified in areas of agriculture and food security, water supply and sanitation, education, awareness and information, human settlements, human health, waste management, fisheries and marine resources, infrastructure, coastal protection, and tourism. Key options for climate change mitigation are focused on the utilization of renewable energy (hydro and solar) energy efficiency and conservation technologies as per government approved policies and strategies.

2. Summary on climate change related issues in the country

- **Climate change policy**

The Solomon Islands ratified the United Nations Framework Convention on Climate Change (UNFCCC) in December 1994 and then become a party to the Kyoto Protocol, which it ratified in March 2003. The Solomon Islands submitted its initial national communications under the UNFCCC in September 2004.

Solomon Islands has no policy that deals directly with issues relating to mitigation of climate change. However, there are certain government development policies and strategies, particularly in the energy and forestry sector that are of relevance to climate change.

These policies expressed national interests to "...the need to develop its renewable energy potential...", "...the urgent need to start phasing out large-scale logging operations..." and "... A scheme will be established to assist resource owners carry out reforestation in logged areas."

- **National efforts / measures against climate change**

Nationally, the Solomon Islands have already started some work on climate change in regard to its obligations under the three treaties that were borne out of the UN Conference on Environment and Development held in 1992 at Rio de Janeiro, namely, the United Nations Convention on Biological Diversity (UNCBD); the United Nations Convention to Combat Desertification (UNCCD) and; the UNFCCC.

The Solomon Islands Government, through its various ministries, departments and agencies, is

contributing to the work of addressing the country's overall obligations in relation to climate change. For instance, the Solomon Islands Meteorological Services is the focal point of climate change in the country, and attempts to ensure that the climate change obligations are being met. Other agencies include the Ministry of Environment and Conservation that is working on the Solomon Islands National Capacity Self Assessment (NCSA) Reports, and the Ministry of Mines and Energy, which works on reporting on the energy aspect of climate change.

Climate Change, Disaster Management and Meteorology division in the Ministry of Environment is designated national authority of Solomon Islands. Solomon Islands have one Programmatic CDM project under validation. The project aims to reduce greenhouse gas emissions from palm oil mills by capturing the biogas generated in the wastewater treatment systems.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

Due to unavailability of sourced information, data, time constraints and apathy on the part of some of the stakeholders, the base line for this inventory was confined to 1994. Record keeping and access to acquiring data from selected sectors has been a major hindrance to the compilation of this inventory. Some of the presumed major sources of data and information, including government departments do not have records or proper recording systems in place.

Top Down and Bottom Up approaches were the basis of this inventory. The Top Down approach basically refers to producers and in the case of Solomon Islands it would refer to the importers whilst the Bottom Up approach refers to users or the consumers.

Table 1: Summary of CO_2 Emission from Fossil Fuel in Top Down Approach

Fuel Type	Total Fuel Imported (kilotons)	Apparent Consumption (kilotons)	Apparent Consumption Terajoules (TJ)	Actual CO2 Emissions (Gg CO2)	Percentage (%)
Gasoline	16.25	16.25	728	49.95	15.48
Jet Kerosene	4.8	3.3	147.15	10.42	3.23
Other Kerosene	3.62	3.62	162.00	11.53	3.57
Diesel oil	76	76	3293.08	241.47	74.86
Lubricants	2.2	2.2	88.42	6.45	2.00
LPG Gas	0.94	0.94	44.47	2.78	0.86
Total CO2 Emissions from Top Down Approach (Gg CO2)				**322.58**	**100**

Note: There was no assumption used in the Top Down Approach as the information and data provided were from reliable sources and therefore indicate true representation of total fossil fuel imported.

Table 2: Summary of CO_2 Emissions from Fossil Fuel Combustion using Bottom Up Approach

Fuel Usage By Sector	Consumption and Emissions		
	Apparent Consumption (kilotons)	Apparent Consumption Terajoules (TJ)	Actual Emissions (Gg CO2)
Energy Sector			
Diesel Oil	16.68	722.74	53.0
Lubricants	0.18	7.23	0.26
Transport: Sea, Air, Land			
Gasoline	14.84	14.84	45.61
Jet Kerosene	0.8	0.8	2.53
Diesel Oil	44.84	44.84	142.47
Lubricants	1.5	1.5	2.18
International Bunkers: Marine and Aviation			
Jet Kerosene	1.5	66.89	4.73
Diesel Oil	0	0	0
Lubricants	0	0	0
Commercial Institutions			
LPG gas	0.33	15.61	0.97
Other Fuel	0	0	0
Agriculture, Forestry and Fisheries			
Gasoline	1.46	65.41	4.49
Diesel Oil	9.2	398.64	29.23
Lubricants	0.21	8.44	0.31
Residential			
Other Kerosene	3.62	162.0	11.53
LPG gas	0.61	28.86	1.80
TOTAL (excluding international bunkers)			**294.38**
Notes:			
1. Total CO2 emissions exclude emissions from international bunkers inline with IPCC reporting Guide lines			
2. Avgas and Petrol are included as Gasoline			

The total carbon dioxide emissions from the bottom up approach is less than that from the top down approach because diesel oil is also used in various ways which were not accounted for in this inventory. These include its use in rural areas and some educational institutions for lighting, farming and other general uses.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Solomon Islands has not submitted its NAMA plan.

- **Mitigation Options**

Mitigation options by the Solomon Islands are measures to limit and reduce emissions from the supply and utilization of energy, and enhancing sinks of carbon dioxide.

Energy Efficiency and Conservation

a) Lighting

Lighting is a major energy consumer in buildings and there is potential for making energy savings and reducing CO2 emissions. This may be achieved by replacing inefficient lamps with high efficiency alternatives.

b) Air Conditioning

Air conditioning in government offices and business houses can be a major source of energy consumption in Solomon Islands. It is possible to reduce the amount of energy consumed in air conditioning by proper maintenance and introducing more efficient air conditioners with controls that allow the system to shut down when the system is not needed.

c) Refrigerators

Refrigerators are common source of energy consumption in residential and government buildings. New refrigerator efficiency has been improved dramatically in the major markets and energy savings can be made by the diffusion of this technology into Solomon Islands.

Renewable Energy Technologies

a) Hydro-electricity

Small-scale hydro-electricity generation had been introduced into the rural areas of Solomon Islands and there is potential for its development in other suitable areas. On a larger scale, there is also potential for hydro-electricity generated in the urban areas of Solomon Islands, and this would substantially reduce the dependence on fossil fuel generated electricity, particularly in the Capital.

b) Solar Thermal

Solar thermal is in use in the Solomon Islands mainly for water heating in residential buildings and some government offices in the urban areas.

c) Solar PV Technology

This technology has been introduced to several villages for lighting and powering radios and refrigerators. This technology has the potential for adoption as a major energy source for the rural communities in the Solomon Islands.

d) Biomass

Oil palm and copra industries in the Solomon Islands are using limited biomass generated electricity in their operations and the technology could be adopted to other similar industries.

Enhancing Greenhouse Gas Sinks and Sustainable Land Management

The Solomon Islands Government has policy actions to:

a) reduce current levels of harvest to a sustainable level through current moratorium now in effect on the issuing and renewal of licenses, revise existing law on forestry, and establishment of a National Conservation Trust Fund for funding protection, conservation, replenishment and development of exploited natural forest resources;

b) achieve higher levels of efficiency in forestry harvest and reducing adverse environmental impact to a minimum;

c) privatise plantation estates in order to improve their management; and

d) continue to encourage and facilitate reforestation projects.

Ground Transport Sector

It is realized that appropriate policies and measures be put in place to control and regulate the importation of automobiles and vehicles meeting certain specifications and standards with preferences for efficiency and environmentally friendly vehicles.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

While there is a wide diversity of social and biophysical environments within Solomon Islands, there are some particular systems throughout the country that are likely to be sensitive to climate and sea-level change. Those identified as being of greatest importance are: 1) Subsistence and Commercial Agriculture, 2) Human Health, 3) Coastal Environments and Systems, 4) Water Resources, 5) Marine Resources.

Subsistence and commercial agriculture

Subsistence food crops are already adversely affected by extreme events like droughts and cyclones. Any increase in frequency or intensity of extremes due to climate change, in the future could lead to lower crop yields.

Human Health

Temperature influences the rate of parasite multiplication in carrier mosquitoes as well as mosquito biting rates. Thus, overall temperature strongly influences epidemic potential. Higher humidity increases mosquito longevity. It is anticipated that the projected increases in temperature will increase the incidence of malaria in areas already affected.

Extreme events such as cyclones and flooding have several direct negative effects on public health including loss of life, injury and outbreaks of cholera and other diarrhoeal diseases.

Coastal Environments and Systems

The effect of sea level change combined with storms and cyclones could pose an even higher risk of flooding and inundation.

Coastal erosion is already evident in many parts of the country. Protective works along the shoreline have been eroded and the situation now is that parts of the road passing through it have been washed out. This process has been observed over a number of years but at a faster rate in recent years.

Coral reefs are important in Solomon Islands as they are the main source of sediment for beach formation, provide protection from storm events and are productive habitats and ecosystems. During the recent El Nino there were lower sea levels, which resulted in warmed coral habitats and coral bleaching in some parts of the country.

Water resources

Climate change is likely to affect both water quantity and quality in sensitive areas of Solomon Islands. In the past, events such as El Nino have had significant impacts on water sources in some part of the country. Thus, any decrease in average future rainfall or increase in drought frequency or length would adversely affect water supply. Sea level change may result in salt-water intrusion of the important fresh water lenses of the low-lying islands and atolls. This would be worsened by flooding and inundation.

Marine resources

There is presently little knowledge about the effects of climate and sea level variations on marine resources. What is known presently is that the distribution of tuna stocks is affected by sea surface temperature variations. The changes in sea surface temperature and ocean currents associated with the 1997/98 El Nino reduced the Solomon Islands tuna catches. If average sea surface temperatures change in the future diminished catches might occur more often.

- **Summary of National Adaptation Programme of Action (NAPA)**

NAPA will communicate priority activities addressing the urgent and immediate needs and concerns of Solomon Islands, relating to adaptation to the adverse effects of climate change. NAPA was prepared through a consultative process using a country team approach, a national synthesis of information covering the various sectors of the economy, a vulnerability analysis and community and/or village consultations.

Based on the high ranking of the priority sectors and the greater likelihood of accessing funding support from the Least Developed Countries Fund for the implementation thereof, a total of seven project profiles were developed, as shown in the next section.

- **Adaptation Options**

The prioritization and ranking of key sectors which require urgent and immediate adaptation actions are included in the following seven project profiles:

(1) Managing the impacts of, and enhancing resilience to, climate change and sea-level rise, on agriculture and food security, water supply and sanitation, human settlements, human health

and education, awareness and information

Goal: To increase the adaptive capacity and resilience of key vulnerable sectors

Component 1: Agriculture and Food Security
The main objective of this component is to increase the resilience of food production enhance food security to the impacts of climate change and sea-level rise.
Component 2: Water Supply and Sanitation
The main objective is to increase the resilience of water resources management to impacts of climate change and sea-level rise.
Component 3: Human Settlement
The main objective of this component is to improve the capacity for managing impacts of climate change and sea-level rise.
Component 4: Human Health
The main objective of this component is to increase the capacity of health professionals to address adverse impacts of climate change on human health.
Component 5: Education, awareness and information on climate change
The main objective of this component is to promote climate change education, awareness and information dissemination.

(2) Climate change adaptation on low-lying and artificially built-up islands in Malaita and Temotu provinces

Goal: The main goal is to facilitate adequate adaptation to climate change and sea-level rise
Objective: To develop and implement plans to relocate as an adaptation measure.

(3) Waste management

Goal: Main goal of this project is to better manage impacts of climate change on waste management
Objective: To develop a national integrated sustainable Waste Management Plan and Strategy for incorporating impacts of climate change.

(4) Coastal protection

Goal: The main goal of this project is to increase the resilience and enhance adaptive capacity of coastal communities, socio-economic activities and infrastructure.
Objective: Integrate climate change adaptation (climate proofing) into construction of a roads and other infrastructure.

(5) Fisheries and marine resources

Goal: To improve the understanding of the effects of climate change and climate variability including El Nino-Southern Oscillation on the inshore and tuna fishery resources.
Objective: To improve the capacity to protect inshore fisheries and marine resources.

(6) Infrastructure development

Goal: To improve the resilience of key infrastructure to climate change and sea-level rise.
Objective: Integration of climate change risk proofing into infrastructure design and development.

(7) Tourism

Goal: To integrate climate change adaptation strategies and measures into tourism planning and development.
Objective: To build capacity in managing impacts of climate change on tourism.

5. Key industries and economic activities

The bulk of the population depends on agriculture, fishing, and forestry for at least part of its livelihood. Most manufactured goods and petroleum products must be imported. T he islands are rich in undeveloped mineral resources such as lead, zinc, nickel, and gold.

Prior to the arrival of Regional Assistance Mission to Solomon Islands (RAMSI), severe ethnic violence, the closing of key businesses, and an empty government treasury culminated in economic collapse. RAMSI's efforts to restore law and order and economic stability have led to modest growth as the economy rebuilds.

6. National development strategy

The overall framework for adaptation to climate change and for development in Solomon Islands is embedded in the Medium Term Development Strategy 2008- 2010 (MTDS). The aim and purpose of the MTDS is the belief by the Coalition for National Unity and Rural Advancement (CNURA) Government that it is only when Solomon Islanders benefit from 'development', that the government can say truly that it is addressing national needs.

The mission of the CNURA Government is to further strengthen development through a bottom-up and holistic approach that encompasses the empowerment of the people through rural advancement strategies, the pursuit of the Millennium Development Goals (MDGs), the revitalization of the economy, improved law and order, effective service delivery and the devolution of powers and functions and decision-making authority to the periphery. One of its key national objectives is to ensure the sustainable utilization and conservation of the natural resources and environment and successful adaptation to climate change.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.9. ツバル

Tuvalu

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Tuvalu is extremely vulnerable to the adverse effects of climate change, and especially to sea level rise as the islands of Tuvalu are only a few metres above sea level. Any rise in sea level will have very serious impact.

Tuvalu is taking measures to achieve sustainable development. In terms of adaptation, it is taking steps in particular to cope with rising sea levels, including

- Increasing resilience of Coastal Areas and Settlement to climate change
- Increasing subsistence pit grown pulaka productivity through introduction of a salt tolerant pulaka species.
- Adaptation to frequent water shortages through increasing household water capacity, water collection accessories, and water conservation technique

2. Summary on climate change related issues in the country

- **Climate change policy**

Tuvalu ratified the United Nations Framework Convention on Climate Change in October 1993 and the Kyoto Protocol in November 1998. Tonga's first national communications was submitted in October 1999. Tuvalu's national adaptation programme of action was submitted in May 2007.

Recognizing Tuvalu's environmental concerns due to threats caused by climate change, especially the adverse impacts of droughts, saltwater intrusion and coastal erosion on the livelihood of the people, Tuvalu developed the National Environmental Management Strategies (NEMS) in 1997 to assist on Tuvalu's efforts to achieve sustainable development, and later in 2005, TE KAKEEGA II 2005-2015 National Strategy for Sustainable Development.

Tuvalu has developed policies and strategies in its KAKEEGA II to stimulate economic growth and stability. This is being done through structural reforms in the public sector, including efficiency improvements, further cost cutting, and focusing on activities that are core-functions and which have high rates of returns that are key strategies in the short and medium-term.

- **National efforts / measures against climate change**

Tuvalu is making the following efforts against climate change.

Education and awareness

Climate change issues have been incorporated into curriculum of primary and secondary schools. In terms of public awareness, a strong position has been taken by the government and

communities through participatory radio programmes, leaflet production, essay competitions, poster competitions, national workshops and visits to outer islands to promote education and awareness on climate change and sea level rise.

Renewable Energy

The Tuvalu Solar Electric Cooperative Society (TSEC) is currently boosting the use of photo-voltaic renewable energy on all islands. The plan is to have the first 30% households provided with solar lighting by the year 2003. A further 35% of households will access solar lighting by 2006 with the remaining 35% to be completed by the year 2010. This is a long term plan and requires some financial support from the government to achieve.

Agriculture

Some of the measures the agricultural department is encouraging on the islands to reduce GHG emissions are:

- To ban burning of twigs, branches, etc when clearing land
- To reduce to the minimum the importation and use of chemical fertilizers
- To encourage the use of organic fertilizer
- To promote a mix farming system (agroforestry)
- To look for alternative uses of pig's waste
- To promote management of culturally important native trees
- To encourage the planting of fast growing local trees for provision of fuel-wood
- To promote proper production of charcoal for use as fuel-wood in cooking

Land use and forestry

The importation and use of chemical fertilizers is no longer encouraged by the Agricultural Department. Instead, the use of organic fertilizer is promoted for the cultivation of food crops. Mix farming (agroforestry) where planting of potential compost trees, fuel-wood trees, winds breaks, shoreline protective trees and food crops is now encouraged on all the islands instead of mono-cropping coconuts as was the practice in the past.

Waste

To relax the problem of waste on Funafuti, government is encouraging the recycling of aluminium cans, waste oil and organic waste. Other forms of waste will be properly disposed at the recommended waste sites. High importation duties are imposed on reconditioned vehicles to reduce the high rates of importation of second hand vehicles. Reduction of waste volume through the establishment of legislation and identifying waste sites is also encouraged.

Tuvalu has not set up a designated national authority and does not have any CDM projects.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

For Tuvalu, the first greenhouse gases inventory was carried out in late 1998 focusing on the three major gases namely carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N2O) as

required by the UNFCCC. The result of the greenhouse gases inventory is given below.

Table 1: Tuvalu Summary of Emission

	Year	tons								
Energy		CO_2	CH_4	N_2O	NOx	CO	NMVO	HFCs	PFCs	SF6
Energy sources	1994	4,650	0	0	0	0	0	0	0	0
Traditional biomass burned for fuel	1994	0.000	0.000234	0.00000193	0.0000697	0.0245	0	0	0	0
Coal Mining and Handling	1994	0.000	0	0	0	0	0	0	0	0
Oil and Gas Activities	1994	0.000	0	0	0	0	0	0	0	0
Total for Energy		4,650	0.000234	0.00000193	0.0000697	0.0245	0.000	0.000	0.000	0.000
Industrial Process										
Cement Production	1994	0.000	0	0	0	0	0	0	0	0
Total for Industrial Process		0.000	0	0	0	0	0	0	0	0
Solvent and Other Product Use	1994	na								
Agriculture										
Domestic livestock enteric fermentation and manure management	1994	0.000	42.3	0. 0156923	0	0	0	0	0	0
Flooded Rice Fields	1994	0	0	0	0	0	0	0	0	0
Burning of Savannas	1994	0	0	0	0	0	0	0	0	0
Field burning of Agriculture residues	1994	0	0	0	0	0	0	0	0	0
Total for Agriculture		0.000	42.3	0. 0156923	0	0	0	0.000	0.000	0.000
Land Use Change & Forestry										
Change in forest and other woody biomass stock	1994	0	0	0	0	0	0	0	0	0
Forest and Grassland conversion	1994	0	0	0	0	0	0	0	0	0
Onsite burning of forest	1994	0	0	0	0	0	0	0	0	0
Abandonment of managed land	1994	0	0	0	0	0	0	0	0	0
Total for Land Use Change a & Forest		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Tuvalu has not submitted its NAMA plan.

- **Mitigation Options**

To meet the challenges presented by climate change and development, Tuvalu needs to focus on the gaps in information and constraints identified below.

Information lacking for appropriate adaptation and management

Most of the predicted changes relating to climate change and sea level rise are not clear what the changes for Tuvalu might be. For management and adaptation measures to be effective, they need to be based on models which are relevant and as accurate as possible. There is an urgent need for modelling which is focused on the Pacific Region, which can give climate change predictions at the scale of individual countries.

At the national level, it is important that the arrangements for updating the GHG inventory are maintained and that vulnerability and assessment studies are regularly up-dated. In addition, existing programmes for monitoring changes in climate and sea level need to be supported and data they collect compared with predictions.

Improving interactions between humans and their environments

Living with climate change is also about dealing with day-to-day environmental integrity. This implies that healthy ecosystems are resilient ones, and that good policies and management practices introduced now, will lead to the best outcomes in ht facer of climate change. The issues are inseparable developments that improve the country not only economically, socially, and culturally, but also environmentally. Further, to ensure that the outcomes of climate changes come as no surprise and that appropriate adaptation are made, it will be necessary to integrate climate changes into national planning.

Initiatives needed to address issues of climate changes and resilience

New initiatives are required to refine predictions, assess the present and future resilience of the country to climate change and other impacts, improve planning and management, and to minimize impacts. The project needed fall into three categories. These are research, education and capacity-building and improvements in practices and technology.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

The problem of climate change caused by the anthropogenic emissions of greenhouse gases has posed the following impact on small island states like Tuvalu:

Sea level rise

The islands of Tuvalu are only a few metres above sea level. Any rise in sea level will have very

serious impact on human health, houses, infrastructure, food crops, ground water sources, land and marine biodiversity, vegetation, and the shoreline. Sea level rise could also cause serious coastal erosion and land loss on all the islands, lower crop yields and in some cases might lead to the loss of entire islets.

Rising temperature

As predicted by scientists, the temperature of planet earth is expected to rise slowly in the next thousand years. The impact of that rising temperature on the atoll nations will be expensive. An increase in the sea temperature by just one-degree is expected to affect the population of other marine biodiversity including fishes, the shellfish species and others. Agricultural production may decline in terms of crop yields because of salination and increased transpiration, and will make local food production more expensive. There is an expected emergence of new agricultural pests, which may make local food production more difficult. Health risks through mosquito vectors are predicted to rise and may affect health and quality of life of humans.

Coastal erosion and infrastructure development

Coastal erosion is a common feature of the islands under natural conditions and it is a continuing problem for all Tuvalu islands. The rate of erosion during the predicted rise in sea level is at the rate of one metre of shoreline loss pre year. An increase in population and growth in demand for permanent houses and infrastructure has resulted in increased demand for gravel for building and constructional purpose. This has led to a more serious coastal erosion problem especially on the capital Funafuti. With an expected increased in frequency of strong winds, and increased internal migration to Funafuti, the predicted problem with coastal erosion are likely to be worst on Funafuti.

Biodiversity

The entire population of Tuvalu depends largely on marine resources as their main source of protein. With increasing pressure on the marine resources, some of these resources are becoming scarce that their continued existence is highly endangered. Given the low lying feature of the islands, only a few metres above sea level, the predicted sea level rise, rising temperatures etc, both our land and biodiversities are very vulnerable to these adverse effects of climate change. Endemic species are the most susceptible to the extreme events of climate change and may reach a point of complete extinction.

Solid and liquid waste

From observation, there is a marked increase in solid and liquid waste especially on Funafuti. The overall impact of increased waste and poor management on the islands is the degradation of our clean environment.

Oil and other hazardous wastes are posing the following risks-

- Contamination of the underground water resource and
- Sea water pollution around the main settlement area (with associated increase in algal cover, losses of corals and the emergence of algal blooms)

- **Summary of National Adaptation Programme of Action (NAPA)**

The Tuvalu NAPA was developed to support the Kakeega II, National Strategy for sustainable development 2005-2015; in synergy with other action plans and other development aspirations of the government of Tuvalu.

The goal of the Tuvalu NAPA is to provide a framework that will guide the coordination and implementation of adaptation activities in the country.

The main objectives of the NAPA are:
(1) To develop a country-wide programme that encompass urgent and immediate needs of communities;
(2) To implement immediate and urgent adaptation activities to climate change and variability;
(3) To enhance communities awareness and livelihood; and
(4) To mainstream adaptation measures into national and sectoral planning.

- **Adaptation Options**

The Tuvalu NAPA is mindful that in addressing future adverse effects of sea level rise is a complex issue for Tuvalu. A system approach acceptable to the community concerned must be suggested. In addition, NAPA is also aware that no Potential Adaptation Strategies (PAS) could absolutely eliminate adverse impacts of climate change, variability, sea level rise and extreme events. Therefore, stakeholders' still have to bare some of the cost of climate change. Listed below are the PAS selected for the Tuvalu NAPA in descending order of priority.

Project No.1 Coastal: Increasing resilience of Coastal Areas and Community Settlement to climate change.

Goal

Increasing resilience of Coastal Areas and Community Settlement to climate change

Objectives

• Increased protection of Coastal Areas from Erosion; and
• Increased protection of Coastal Communities from natural phenomenon.

Project No.2 Agricultural: Increasing subsistence pit grown pulaka productivity through introduction of a salt-tolerant pulaka species.

Goal

Increasing Pulaka Productivity in Tuvalu.

Objectives

• Increase number of abandoned pulaka pit re-planted; and
• People's preference for fresh nutritious pulaka increased.

Project No.3 Water: Adaptation to frequent water shortages through increasing household water capacity, water collection accessories, and water conservation techniques.

Goal

Adaptation to frequent water shortages through increasing household water capacity, water collection accessories, and water conservation technologies.

Objectives

• Increased household water storage capacity and water collecting accessories; and
• Increased use of water conservation technologies.

Project No.4 Health: Strengthening of Community health through control of vector borne/climate sensitive diseases and promotion access to quality potable water

Goal

To protect Community health through control of vector borne / climate sensitive diseases and promotion community access to quality potable water.

Objectives

• Increasing community access to clean water; and
• Controlling Climate sensitive and water-borne diseases.

Project No.5 Fisheries: Strengthening of Community Based Conservation Programmes on Highly Vulnerable near-shore Marine Ecosystems.

Goal

To Develop and Strengthen Community Based Conservation Programmes on Highly Vulnerable Marine Ecosystems.

Objectives

• Increased protection of Coastal Marine Biological Diversity;
• Develop and Strengthen Community Sustainable biodiversity conservation programme;
• Increased productivity of Coastal Marine Biological Communities; and
• Develop a Stakeholders awareness programme that will enhance traditional and modern conservation practices.

Project No.6 Fisheries: Adaptation to Near-Shore Coastal Shellfish Fisheries Resources and Coral Reef Ecosystem Productivity.

Goal

Adaptation to Near-Shore Coastal Shellfish Resources and Coral Reef Ecosystem Productivity.

Objectives

• Increased protection of Shellfish population;
• Increased protection of Coral Reef Ecosystems Productivity; and
• Increased Public Awareness and Livelihood.

Project No.7 Disaster: Strengthening Community Disaster Preparedness and Response Potential.

Goal

Strengthening of Community Disaster preparedness and response capability.

Objectives

• To ensure community preparedness and effective response to disasters; and
• To ensure that climate hazard risks on island communities reduced.

5. Key industries and economic activities

Tuvalu consists of a densely populated, scattered group of nine coral atolls with poor soil. The country has no known mineral resources and few exports and is almost entirely dependent upon imported food and fuel. Subsistence farming and fishing are the primary economic activities. Fewer than 1,000 tourists, on average, visit Tuvalu annually.

Job opportunities are scarce and public sector workers make up most of those employed. About 15% of the adult male population work as seamen on merchant ships abroad, and remittances are a vital source of income contributing around $2 million in 2007. Substantial income is received annually from the Tuvalu Trust Fund (TTF) an international trust fund established in 1987 by Australia, NZ, and the UK and supported also by Japan and South Korea. Thanks to wise investments and conservative withdrawals, this fund grew from an initial $17 million to an estimated value of $77 million in 2006. The TTF contributed nearly $9 million towards the government budget in 2006 and is an important cushion for meeting shortfalls in the government's budget. The US Government is also a major revenue source for Tuvalu because of payments from a 1988 treaty on fisheries.

In an effort to ensure financial stability and sustainability, the government is pursuing public sector reforms, including privatization of some government functions and personnel cuts. Tuvalu also derives royalties from the lease of its ".tv" Internet domain name with revenue of more than $2 million in 2006. A minor source of government revenue comes from the sale of stamps and coins. With merchandise exports only a fraction of merchandise imports, continued reliance must be placed on fishing and telecommunications license fees, remittances from overseas workers, official transfers, and income from overseas investments. Growing income disparities and the vulnerability of the country to climatic change are among leading concerns for the nation.

6. National development strategy

Delegates at the National Summit on Sustainable Development (NSSD) produced a very clear set of strategic directions the nation should take, based on the issues that are considered to be (and are) national priorities. The NSSD defined the eight strategic areas (or sectors), which are the broad priorities for development over the next ten years.

- Good Governance.
- Macroeconomic Growth and Stability.
- Social Development: Health, Welfare, Gender, Housing, and Poverty Alleviation.
- Outer Island and Falekaupule Development.
- Employment and Private Sector Development.
- Human Resource Development.
- Natural Resources: Agriculture, Fisheries, Tourism, and Environmental Management.
- Infrastructure and Support Services.

Cutting across the eight strategies are any number of important issues, for example: outer island depopulation and urbanisation of Funafuti; declining rural agricultural production, food security; increasing youth unemployment; nutrition and the incidence of non-communicable disease; the threat of HIV/AIDS; and the solutions to hardship and poverty experienced by many families.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.10. ドミニカ共和国

Dominican Republic

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Being an island state, the Dominican Republic is vulnerable to the effects of climate change. Recent economic strides made due to the burgeoning tourism sector is under threat from changing climatic conditions affecting water sources, and financial losses and catastrophe owing to extreme weather events. The sectors pertaining to water, agriculture and coast zones, prioritized in the country's National Adaptation Plan of Action (NAPA), should be the main focus in the country's readiness for climate change induced adversities.

2. Summary on climate change related issues in the country

- **Climate change policy**

The Dominican Republic signed the United Nations Framework Convention on Climate Change (UNFCCC) during the Earth Summit held in Rio de Janeiro in June 1992 and ratified it in October 1998. Subsequently, it ratified the Kyoto Protocol in February 2002. With this, the country undertook the preparation of the First and Second National Communications in accordance with Article 12, with the help of the Global Environment Facility (GEF).

The Secretariat for the Environment and Natural Resources (SEMARENA, acronym in Spanish) is responsible, since its creation through Dominican law 64-00, for carrying out the environmental policies related to the "green and brown agenda" of the Dominican Republic.

In order to comply with the mandate of the UNFCCC in relation to drawing up mitigation and adaptation plans, the country has carried out studies and structured projects with the aid of external resources (FMAM, CIDA and UNDP) and, in most cases, with very little local resources.

SEMARENA had a Clean Development Mechanism (CDM) office, created by decree 786 in 2004, which was abolished in order to create decree 601-08, which in turn created the "National Council for Climate Change and the CDM". This CDM office is tasked with promoting and enabling CDM project development in the country, such as renewable energy, energy efficiency, fuel switch, etc. It coordinates, promotes and organizes local and international meetings in collaboration with the Foreign Affairs Secretariat.

In 2007 the Dominican government passed Law 57-07, "Incentive for Development of Renewable Energy" that has several strategic objectives. These are:

- Increasing energy diversity in the country to include non-conventional energy and fuels in so far as they are more viable.
- Reduce dependence on imported fossil fuels.

- Encourage private investment projects developed from renewable energy sources.
- Promote the participation of private investment in electricity generation subject to the regulations of the competent bodies in accordance with the public interest.
- Mitigate the negative environmental impacts of fossil fuel energy operations.
- Encourage community social investment in renewable energy projects.
- To contribute to the decentralization of electricity production and biofuels, to increase market competition between different energy supplies.
- Contribute to the achievement of the goals proposed in the National Strategic Plan, specifically as it relates to renewable energy sources, including biofuels.

The Dominican Republic has no other natural energy sources other than bioenergy, solar energy, wind and hydropower, and consequently the rational use of energy offers the opportunity to contribute to global environmental goals (reducing GHG emissions), bringing with it important local co-benefits.

National Adaptation Plan of Action

The Dominican Republic, as a small developing island-state, is very vulnerable to variability and climate change. Therefore, in compliance with the obligations stemming from the UNFCCC, it has prepared its own National Adaptation Plan of Action (NAPlA)– despite it not being a least developed country – with the objective that it be included within the country's development policies. NAPlA's conceptual framework is supported by the vision for adaptation based on extreme climatic events and the climatic variability.

The Dominican Republic has taken the subject of climate change very seriously and is therefore including it in its national development plan. Through SEMARENA, the Dominican government has prepared two structured programs for the second communication in order to make every effort to reduce the impact of climate at a national level: "Guidelines for a National Strategy for Climate Change" and the "National Action Plan for Adaptation to Climate Change".

In regards to financing needs, the country has dedicated few resources to climate change because available resources are usually appropriated for the fight against poverty and remedy the impacts of extreme climatic events that frequently affect the country. This makes it difficult for the country to dedicate resources in compliance with the Convention's mandate on mitigation, adaptation and technology transfer. As a result, the financial resources received to comply with the convention's mandate through the GEF and bilateral agencies have facilitated the preparation of the first and second National Communications, the conducting of studies and capacity building. Without this support, it would be impossible for the country to formulate its third national communication.

- **National efforts / measures against climate change**

The country is a non-Annex Party under the UNFCCC and therefore not obliged to greenhouse gas reduction commitment.

CDM projects

As of June 2012, there are four CDM projects registered in the Dominican Republic. Three of them are wind power projects, the remaining one being a landfill project. The total anticipated reductions from all four projects are 564,938tCO2 per year. There are also 18 other projects under Validation, the majority of them being wind power. There are also a few biomass projects, as well as a fuel switch project.

The Dominican Republic has received support from the governments of Canada and Japan in relation to CDM. Japan helped in the development of a map to highlight areas that have potential for forestry CDM projects. From Canada, the government received assistance to carry out a study to determine the country's potential for implementation of CDM projects by sector.

Other efforts for mitigation

Other mitigation projects being developed include the systematic observation performed by the country through the National Meteorological Office, and the Dominican Hydraulic Resources Institute; the country is also receiving support from the Water for the Tropical Rainforest Center for Latin America and the Caribbean, through the SERVIR program, financed by USAID and NASA.

As far as education and raising people's awareness, the country has substantially increased the quantity of seminars, workshops and publications directed to the general population and decision makers. Through SEMARENA's web page (www.medioambente.gov.do), a large amount of information has been made available to the public on climate change, including every study conducted during the first and second communications, and links to publications by the UNFCCC and the IPCC.

The National Council for Climate Change and the CDM, created by decree 601-08, gives political significance to the subject and favours interaction between the government's secretariats so that the subject of climate change crosses through the public and the private sectors, including non-profit organizations.

After the first national communication was published, in which the first vulnerability and adaptation to climate change studies were made, an important country analysis was conducted, called "Framework Project, for Adaptation to Present and Projected Droughts Policies in the Dominican Republic", which was prepared with the support of the Canadian International Development Agency (CIDA).

The Dominican government is also promoting construction of hydroelectric generators with international financial support. All the country's hydroelectric generators are managed by the Hydroelectric Generation Enterprise (HGE), created under Dominican law 125-01 in June 2001, and decree 628-07 dated November 2, 2007. It has 22 central stations in "Operation 22", with an installed capability of 468.67 MW.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

Amongst all the greenhouse gases recorded in the inventory for the second national communication, carbon dioxide gas has the largest share, accounting for between 93 to 95% of the national totals. Regarding the energy consumption structure, the transportation sector makes up for more than 47% of end consumption, which are met exclusively by fossil fuel sources. In this sector the main sources are gasoline and diesel oil; the largest consumers being private cars and freight services.

The residential sector (urban and rural) is responsible for around 25% of total consumption, with a very different structure in urban and rural areas. In the former, fossil fuel is predominant, directly and indirectly (generation of electricity), while in the latter, renewable energies prevail, such as the use of firewood, to cook food. Although the industry has a balanced structure between fossil fuels, renewable energies and electricity, the predominant sources in the generation of the latter imply a preponderance of fossil sources.

As a whole, directly or indirectly, fossil fuel sources exceed 80% of final consumption; and the total consumption of energy in the Dominican Republic tripled in the past 30 years. The energy system depends mostly on imported energy and this dependency on imported sources has increased in recent years. Liquid petroleum gas is the predominant fuel used by the most deprived sectors in many countries in the region.

Table 1: Total CO2 emissions, removals & changes, Dominican Republic, 1994 & 2000

CO2 emissions & removals	**1994** (in Gg CO2 equivalent)	**2000** (in Gg CO2 equivalent)	**Average annual growth rates, in % per year** (from 1994 to 2000)
CO2 emissions without LUCF	15,003.1	18,416.8	3.5
CO2 net emissions/removals by LUCF	-6,633.2	-18,808.6	19.0
CO2 net emissions/removals with LUCF	8,369.9	-391.8	--
GHG emissions without LUCF	20,441.8	26,433.2	4.4
GHG net emissions/removals by LUCF	-6,504.2	-18,794.1	19.3
GHG net emissions/removals with LUCF	13,937.6	7,639.1	-9.5

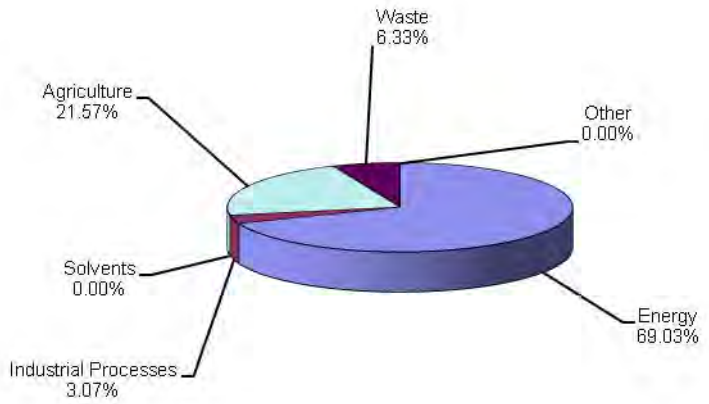

Figure 1: GHG Emissions by Sector (without LUCF) in 2000

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Dominican Republic has not submitted its NAMA plan.

- **Mitigation Options**

In relation to mitigation, reduction of emissions through the energy sector was considered, but 88% of its generation depends on imported fossil fuels, the remaining 12% coming from hydroelectric generators. The energy sector plays a decisive role in the mitigation of GHGs. To this end, the Dominican Corporation of Government Electric Enterprises, and the Secretariat for Industry and Commerce are working in programs and measures to encourage the saving and efficient use of energy, such as a fuel switch, the use of renewable energy sources and biomass.

Policies pertaining to the rational use of energy must be oriented to the development of studies and the implementation of Law 57-07 on the Use and Development of Renewable Energy covering all economic sectors.

Table 2: A List of Mitigation Measures for Various Sectors

Agriculture sector
- Management of swine manure on pig farms for methane capture and subsequent use in generating energy and cooking food;
- Avoidance of methane through the composting of solid waste facility agribusiness;
- New crops of sugar cane with specific focus on supplying raw materials to autonomous distilleries;
- Creation of strategies for the export of biofuels;
- Articulate agro-industrial development programs that create multiple benefits (energy, social, economic and environmental).

Demand side management

- Policy and institutional and financial mechanisms to promote mass transit;
- Tax incentives for the introduction of more efficient vehicles;
- Program of ethanol and biodiesel for automotive use;
- Setup massive solar collectors, replacing LPG for boilers, and replacing incandescent lamps in the following sectors: Urban Residential, Hotels, Restaurants, Commerce, Services and Government;
- Design guidelines for a program of standardization, certification and labelling of appliances, specifying residential sector energy consumption and allow for comparison between commercially available alternatives;
- Guidelines for a program of more efficient air conditioner consumption through better equipment and insulation and changes in practices and usage patterns;
- Establish guidelines for a program of efficiency in food preservation, by substituting equipment and changes in use patterns;
- For rural households, a program designed to promote the use of LP, with the aim of replacing fire wood in cooking;
- Program to encourage cogeneration as a way to efficiently use the residual heat of processes industry. In particular, bagasse cogeneration in the sugar industry;
- Develop specific programs for captive fleets to facilitate the switching to new fuels.
- Reducing emissions from energy efficiency measures in commercial facilities and services;
- Replacement of vehicular fuel in public transport through the use of ethanol and biodiesel;
- Replacement of boilers using bunker in thermal power generation by biomass, among others.
- Program to encourage cogeneration as a way to efficiently use the residual heat of processes industry. In particular, bagasse cogeneration in the sugar industry.

Technology

- Develop an inventory of efficient equipment and technological innovations that are most efficient in each economic sector. Develop technical specifications for each technology, establishing their characteristics, advantages and disadvantages compared to conventional technologies, approximate date of introduction to the market on commercial terms and feasibility and potential for use in the Dominican Republic;
- Characterization, analysis and evaluation of environmental impacts and externalities associated with “rational use of energy” programs and the technologies discussed. Likewise, define and environmental risk factors that characterize each type of project and means of prevention, mitigation, and compensation;
- Identify potential technological niches, viable for scientific, technical and economic development.

CDM

- Take advantage of opportunities offered by global and specific context of climate change, such as CDM and other similar programs (multilateral or bilateral), linked to the carbon markets;
- Strengthening national capacities for the development of CDM projects;
- Create mechanisms and update procedures for approval, regularize it and promote them to have a quality portfolio;

- Establish indicators of sustainable development and national baselines for transport, waste, forestry and others;
- Establish a carbon fund and identify sources of international financing;
- Development of a dissemination strategy.

4. Adaptation and Vulnerability

● Vulnerability to climate change

As a Small Island Developing State, the Dominican Republic is vulnerable to climatic hazards and changes. To date, its main climatic risks have been associated with extreme events, especially hurricanes and tropical storms. Next to these threats, incremental changes have been viewed as being of lesser importance. Temperature averages have increased slightly over the last 50 years, and rainfall has decreased mainly in the wet season. These trends are likely to persist, although current projections have high uncertainty ranges. Temperatures are projected to increase by around 1 to 5°C by 2100. Rainfall is expected to decrease further, although some scenarios also show increases. Sea level rise is a serious threat, as it could inundate low-lying areas and worsen the impacts of future storms and hurricanes.

The NAPIA identifies freshwater, tourism, agriculture and food security, human health, biodiversity, forests, coastal and marine resources, infrastructure, human settlements and energy as being vulnerable sectors. The sectors of freshwater, agriculture and food security, and coastal and marine systems were prioritized due their high vulnerability and importance in human and economic development. About one-third of the Dominican Republic's freshwater, for example, comes from groundwater sources that are already under threat due to over-exploitation, saltwater intrusion (due to excessive abstraction) and/or pollution. Climate change could put these resources at greater risk as sea level rise leads to greater intrusion of saltwater into freshwater sources. A total of 136 adaptation measures listed by sector are identified in the NAPIA.

Most project activities focus on capacity building, knowledge communication and research.
Reflecting the relative importance of extreme weather events in comparison to incremental changes among past and current climatic risks, the Dominican Republic hosts a wide range of disaster risk management projects, ranging from preventive measures to post-disaster management. These initiatives are being implemented by the government, non-governmental organizations, the Red Cross, the United Nations Development Programme (UNDP), and others. Disaster prevention projects often have adaptation co-benefits. However, so far few projects have explicitly focused on climate change.

<u>Expected impacts of Climate Change on the Rio Haina Basin</u>
The intrusion of sea waters into underground water is one of the most serious problems derived from the impact of climate change. The reserve of subterranean waters in the basin would be seriously affected due to its physical-chemical deterioration and the decrease of the water potential as a result of poor rainfall.

Associated with current use and soil management in the basin, there is a clear set of environmental problems identified by the Ministry of Environment and Natural Resources. These problems include the following:

- Scarcity and water pollution from various sources
- Soil erosion of upstream Rio Haina, sedimentation in downstream and the coast of Rio Haina;
- No local land use planning;
- Weak community organization lacking a board or authority of the basin;
- Irrational use of natural resources and the environment;
- Contamination with solid and liquid wastes;
- Conflicts of land use.

Expected impacts of Climate Change on Malaria and Dengue

Threats against health, caused by extreme climatic events in the Caribbean include diseases transmitted by insects and rodents, such as dengue, leptospirosis, malaria and yellow fever, diseases transmitted by aquatic vectors, including schistosomiasis, cryptosporidium, and cholera.

Estimation of possible future impacts of climate change must be based in an understanding of the present burden and recent tendencies in the incidence and predominance of diseases that are sensitive to the climate, and the connections between climate and health. Consequently, the study in the Second National Communication is directed towards the identification of tendencies, connections and identification of the variation tendencies in the climate that cause favourable situations for breeding dengue and malaria in the Dominican Republic. If these adverse conditions persist or there is a change in variability or tendency in the basic climatic conditions, the future impact would be severe.

Expected impact of climate change on the tourist areas of Bávaro and Punta Cana

Studies indicate rising temperatures between 0.3 and 0.7 degrees centigrade, an increase in sea levels between 3.8 cm and 25.9 cm by the year 2030, a decrease in rainfall and an increase in frequency and intensity of extreme events, such as tropical storms and hurricanes in the tourist areas of Bávaro and Punta Cana. This will trigger social and economic impacts which will affect every sector related to the tourist sector.

Rising temperatures could destabilize seasonal patterns in the flow of tourists. Deep sea-diving ecotourism could be affected due to erosion of coral reefs and other diseases; the coastline could become unprotected due to loss of reefs and a decrease in the carbonated material contributed by the reefs, which will imply a decrease or loss of sandy beaches.

Because of rising sea levels, the lower coastal areas will be submerged under water. The coastal landscape will change due to an increment of erosion, emergence of rocks and loss of natural vegetation and sandy beaches, thereby reducing the beach's load capability (square meters available/tourist.)

The expected rise in sea levels will trigger flooding of the basin mangroves, impacting forest zoning, in which the ratio between water and the mangrove's soil biota plays an important role. The tourist infrastructures closest to the coastal edge could also be affected.

Changes in the rainfall pattern could decrease the volume of drinking water in the basins due to drought, creating supply difficulties for the tourist population; and the saline water intrusion due to a combination of rising sea levels and decreasing rainfall could imply the loss of quality in the potable water reservoirs.

Socioeconomic impacts will translate in losses of capital for the investors, loss of jobs, both indirect and direct employment, and economic losses could extend to other economic sectors that supply goods and services to the tourist sector, such as agriculture, fishing, construction and suppliers of cleaning chemical products.

Effects of climate change on the biodiversity of the Dominican Republic

A study was conducted on: a) available secondary information, evaluating impacts, vulnerability and possibilities of adaptation to climate change of the various elements of biodiversity in the country; and b) defining a capacity building program geared towards vulnerability and adaptation of biodiversity to climate change in the Dominican Republic.

Emphasis is made on the main ecosystems and species that could be affected by climate change, according to imagined scenarios. As part of adaptation, the study identifies possible measures and policies that tend to reduce the vulnerability of biodiversity to climate change.

Effects of climate change on agriculture

Regarding the impacts of climate change on basic crops, the following scenarios were outlined in the Second National Communication: scenarios for potential yields; yields limited by water shortage; and yields limited by lack of nutrients.

Regarding potential yields, in spite of the large topographic diversity of the Dominican Republic, which implies an important change in the impact of climate change on crops due to the differences in temperatures that they entail, the negative effects on potential performance of the agricultural productivity in all areas were considered taking sweet potatoes as a sample. The main vulnerability to agriculture is the shortened crop cycle due to water shortage. In most crops taken into consideration, yield of the dry area will fall to half their present value between 2020 and 2050, while by 2080 productivity will be significantly less, and will eventually disappear in the case of some crops.

- **Summary of National Adaptation Programme of Action (NAPA)**

Dominican Republic has not submitted its NAPA.

- **Adaptation Options**

Haina Basin

The management plan of the Haina Basin includes the following:

- To improve living conditions and environment of communities in the watershed of Haina, with the establishment of woodlots, agroforestry, conserving soils, reducing

sedimentation of existing water works to increase lifespan and reduce solids and liquid pollution;

- Eliminate slash and burn in the forests in the upper basin, to enable planting of annual crops;
- Improve the level of income for farmers, promoting productive alternatives to improve the environment without degrading the soil;
- Eliminate extensive livestock on hillside soils and the river;
- Improve the infrastructure for community services (roads and local roads, schools, community, health centres, latrines);
- Involve public and private institutions in the implementation of this management plan;
- Implement an ongoing program of environmental education, extended to the entire population; and
- Implement a program of water and soil conservation.

Dengue & Malaria

The management plan of the dengue and malaria includes the following:

- Improve statistics, vigilance and knowledge of future projections; this measure is meant to strengthen an integral system of observation of all relevant variables in order to characterize the malaria and dengue situations.
- Carrying out studies to determine malaria and dengue epidemiologic pattern in the face of potential impacts of climate change, by region, in those areas or human settlements that are more sensitive to being affected by infectious and non infectious diseases.
- Educate and transfer technologies and financial assistance; this measure is geared towards establishing an effective educational program that will allow for adequately comprehending the relation between climate and health.

Tourism in Bávaro and Punta Cana

Tourism is one of the pillars of the economy in the Eastern region of the Dominican Republic and it has contributed to generation of foreign currency, jobs and infrastructure; as well as to geographical decentralization, increase of agricultural production and internationalization of the country.

To preserve and extend these successes will depend on the country's understanding of the impacts associated with climate change and our future capability to adapt; moreover, it will depend on our present capability to preserve the ecological and functional integrity of the ecosystems that support this tourism.

Within the adaptation measures to be applied, the following are considered:

- The rehabilitation of the basin mangroves;
- Monitoring present levels of erosion in the beaches, whether due to natural causes or due to anthropogenic ones;
- Protection of coral reefs and protection of marine biota.

Biodiversity

The following are considered pertinent measures and policies for reducing vulnerability of biodiversity to climate change in the Dominican Republic:

- Formalize and put into practice a public awareness and dissemination strategy nationwide;
- Carry out an adequate economic estimate or evaluation on goods and services of the main ecosystems that might be affected by projected climate change, with emphasis on the coastal-marine ecosystems;
- Carry out basic biology and species behaviour studies that are most vulnerable to the projected climate change, including population and invasive species studies;
- Establish a vigilance and evaluation network regarding the impact of climate change on the nesting areas for marine turtles;
- Continue the program of egg incubation and subsequent liberation of marine turtles.
- Reduce and/or eliminate threats and barriers that prevent an effective management of the National System for Protected Areas, as a form of protecting a larger amount of genetic groups, from which new genotypes, capable of adapting to the projected climate change could arise.

Agriculture

In analyzing the measures and adaptation policies on the negative impacts of climate change on the agricultural sector in the Dominican Republic, the proposed adaptation measures are concentrated on the following aspects:

- Climate scientific studies in agricultural production;
- Regionalization of crops;
- Introduction of varieties resistant to unfavourable climatic conditions;
- Improvement technologies and technological discipline in agricultural production;
- Redistribution of sowing areas between different crops;
- New techniques in agricultural production;
- Adapting to new methods and practices in the fight against pests and diseases in agricultural crops.

5. Key industries and economic activities

The Dominican Republic has the second largest economy in the Caribbean and Central American region.

The country has long been viewed primarily as an exporter of sugar, coffee, and tobacco, but in recent years the service sector has overtaken agriculture as the economy's largest employer, due to growth in telecommunications, tourism, and free trade zones. The economy is highly dependent upon the US, the destination for more than half of exports. Remittances from the US amount to about a 10th of GDP, equivalent to almost half of exports and three-quarters of tourism receipts. The Central America-Dominican Republic Free Trade Agreement (CAFTA-DR) came

into force in March 2007, boosting investment and exports and reducing losses to the Asian garment industry. The growth of the Dominican Republic's economy rebounded in 2010-11 from the global recession, and remains one of the fastest growing in the region.

6. National development strategy

The Dominican Republic has had one of the fastest-growing economies in Latin America in the past 20 years. It has significantly reduced its poverty rates and has a high degree of political and social stability. Still, despite this progress, the Dominican economy faces challenges. The country suffers from marked income inequality; the poorest half of the population receives less than one-fifth of GDP, while the richest 10% enjoys nearly 40% of GDP. High unemployment and underemployment remains an important long-term challenge.

The global economic crisis adversely affected growth in 2009, with significant impacts on the country's fiscal position and external financing. In response, the Government of the Dominican Republic designed and implemented a countercyclical macroeconomic program in late 2009, aimed at restoring growth and returning to a primary fiscal surplus in coming years, which will ensure stabilized debt levels. This program is backed by the International Monetary Fund (IMF) through a stand-by arrangement.

The Dominican Republic Country Partnership Strategy 2010-2013 (CPS) emphasizes protecting the poor while enhancing competitiveness and strengthening public institutions for performance accountability. Its four strategic objectives are:

- strengthen social cohesion and improve access to and quality of social services,
- promote competitiveness in a sustainable and resilient economic environment,
- enhance quality of public expenditures and institutional development, and
- build capacity and constituencies for reform.

The strategy combines investment and policy-based lending with analytical work. In the first half of the current CPS, the World Bank has provided record support to the Dominican Republic. Since 2009, US$600.5 million have been approved.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.11. トリニダード・トバゴ

Trinidad and Tobago

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Like other island nations, Trinidad and Tobago is vulnerable to a number of climate change impacts. Most prominently among these are marine resources such as coral and fisheries, wetlands, agricultural productivity, and freshwater access.

Although Trinidad and Tobago has not yet released documents such as a Second National Communication (SNC) or Nationally Appropriate Mitigation and Adaptation Action, the country has been proceeding apace mainstreaming climate change into its policy making processes. Most recently, this culminated in the Draft Climate Change Policy that provides a multi-sectoral approach to pursue mitigation and adaptation.

2. Summary on climate change related issues in the country

- **Climate change policy**

Trinidad and Tobago ratified the UNFCCC on 24 June 1994 and the Kyoto Protocol on 28 January 1999. Trinidad and Tobago submitted their first National Communications Report in 2001.

The Government, cognizant of climate change and its impacts, established in 1990 a Cabinet-appointed Working Group to Determine the Implications of Global Warming, Climate Change and Sea Level Rise. The Working Group is presently chaired by the Environmental Management Authority and, inter alia, advises Government on climate related policies. The Working Group has representation from relevant government ministries, non-governmental organizations (NGOs), and the private sector.

Trinidad and Tobago does not have as yet an official policy for climate change but they have recently released a working document: the *Draft National Climate Change Policy*. This document provides policy guidance for the development of an appropriate administrative and legislative framework in harmony with other sectoral policies to pursue low-carbon development through suitable and relevant strategies and actions to address climate change. The policy seeks to:

(1) reduce or avoid GHG emissions from all emitting sectors
(2) enhance carbon sinks
(3) conserve and build resilient human and natural systems to adapt to the adverse impacts of climate change, including through capacity building and the application of cleaner and energy efficient technologies
(4) protect the natural environment and human health
(5) enhance agricultural productivity and food security

More recently, the following policies have also included climate change as an aspect of their

analysis:

- National Environmental Policy (2006)
- National Policy and Programmes on Wetland Conservation for Trinidad and Tobago (2001);
- National Protected Areas Policy (2011);
- National Forest Policy (2009);
- National Tourism Policy (2009);
- Environmentally Sensitive Areas Rules (2001); and
- Draft Waste Management Programme (2005).

- **National efforts/measures against climate change**

In Trinidad and Tobago, climate change matters at the international level are the responsibility of the Ministry of the Environment. Domestically, responsibility is vested in the Environmental Management Authority (EMA), under the Ministry of the Environment.

For the Kyoto Protocol Clean Development Mechanisms (CDM), the Ministry of Planning, Housing and the Environment of Trinidad and Tobago is the designated national authority (DNA). Currently, there are no CDM projects in Trinidad and Tobago.

A number of policy programmes have recently been enacted and initiatives undertaken which have implications for climate change. These include environmental management policies to cover all major solid, liquid and gaseous emissions to air, land and water; public information programmes; a review of national water management strategies and a biodiversity and forestry strategy.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

The GHG inventory was carried out following the Intergovernmental Panel on Climate Change (IPCC) 1996 Revised Guidelines according to the prescribed sectors: Energy, Industrial Activity (other than Energy), Agriculture, Land-Use Change and Forestry, Waste and International Bunkers. International bunkers are fuels for boats and aeroplanes that travel internationally. These are estimated and reported as memo items, according to the IPCC 1996 Revised Guidelines, and are not included in the inventory accordingly.

Total GHG emissions were estimated to be 15,000 Gg (CO_2 equivalent). Of this, CO_2 contributed 95% of global warming potential (GWP), followed by CH4 with 4.5% and N2O<1%. With respect to sector contribution, the combustion of fossil fuel for the production of energy contributed 66% of the total anthropogenic CO2 emissions, with industrial processes contributing the remaining 34%. Within the energy sector, the energy industries contributed 44% of the total emissions, manufacturing and construction industries 38%, transportation 15%, and other activities 3%. Methane emissions were 71% (24Gg from waste, 18% (6.25 Gg) from agriculture and remaining 11% distributed among the other categories. With respect to N2O emissions, 62% (0.68 Gg) came from agriculture and 34% (0.36 Gg) from the waste sector with a 4% contribution from

industry, energy production and transportation.

The Land Use Change and Forestry Sector served as a sink for Co2 removing 10.2% of the total national anthropogenic emissions. The bulk of this was as a result of abandonment of agricultural holdings and plantations and not necessarily from active reforestation activities.

The table below summarizes Trinidad and Tobago's GHG Emissions in 1990.

Table 1: GHG Emissions by Sector (Gg)

Greenhouse gas source and sink categories	CO2 Emissions Gg	CO2 Removals Gg	CH4 (Gg)	N2O (Gg)	CO (Gg)	NOX (Gg)	NMVOC (Gg)	SO2 (Gg)
Total National Emissions and Removals	14988.0	1524.0	33.9	1.1	405.5	36.9	93.1	8.8
1 ENERGY	9887.0	0.0	1.4	0.0	372.9	36.1	61.1	8.5
2 INDUSTRIAL PROCESSES AND PRODUCT USE	5100.0	0.0	0.8	0.0	14.7	0.1	32.0	8.5
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	0.0	1524.0	1.2	0.0	10.6	0.3	0.0	0.0
4 WASTE	0.0	0.0	24.2	0.4	0.0	0.0	0.0	0.0

Note: rounding errors account for discrepancy in totals.

Source: Republic of Trinidad and Tobago (2001). *Initial National Communication to the United Nations Framework Convention on Climate Change.*

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Trinidad and Tobago has not submitted a NAMA and mitigation actions are not discussed in the *Initial National Communication* (INC) to the UNFCCC.

The country's *Draft Climate Change Policy* discusses mitigation supporting policy development for:

(1) Developing a renewable energy policy and standards;
(2) Developing suitable financial incentives for domestic use and sales to the national grid;
(3) Replacing conventional street lighting with solar powered light emitting diodes (LEDs) utilizing a phased approach through routine maintenance programmes;
(4) Increase energy efficiency in commercial and residential buildings by developing a green building code and formulating and adopting energy efficiency standards;
(5) Increasing the use of alternative fuels and fuel switching in transportation sector;
(6) Increase the use of cleaner technology in all GHG emitting sectors;
(7) Enhance natural carbon sinks;
(8) Maximize the use of the carbon market;

- **Mitigation Options**

The government will strive to develop the country via a low greenhouse gas emission economic development pathway across all sectors of the economy. Accordingly, the government will seek through appropriate actions to, inter alia:

- Increase the use of renewable energy;
- Increase energy efficiency in commercial and residential buildings;
- Increase the use of alternative fuels and fuel switching in the transportation sector;
- Enhance natural carbon sinks through conserving forests and protecting natural systems that contribute to carbon sequestration;
- Maximise the use of the carbon market; and
- Enhance research and development on renewable energy and clean technology.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

The most vulnerable sectors are likely to be water resources and agriculture and, to a lesser extent, the coastal and marine resources, forestry, health and tourism sectors.

Water resources

The issue of water resources is of fundamental importance to the socio-economics of Trinidad and Tobago, given that all of the population depends on water while many industries have substantial water utilization. The main sources of potable water are ground water and surface water systems. Essentially the problem is not one of supply but one of access. In the background of climate change, it will be important to manage water resources as predictions indicate significantly less rainfall and longer drought periods.

Agriculture

While agriculture is not a major economic component of the local economy (3.4% of GDP; CSO, 1999) a fairly large proportion of the population depends in some way on the successful production of major commodities such as sugar and to a lesser extent coconuts, citrus, cocoa, poultry, cattle, and vegetable crops. While a more detailed assessment of the level of vulnerability within these industries is required, the fact that agricultural production depends on the water supply and the atmospheric temperature regime would imply that this industry could be susceptible and vulnerable to any changes that occur in the climate. Sea level rise is more likely to affect the production of coconuts, which tends to be concentrated along the eastern and south-western coasts of Trinidad. Higher temperatures, compounded be lower rainfall or less effective rainfall, could significantly reduce yields throughout the industry.

Coastal and marine resources

The coral reefs of Tobago are under serious threat from both sea level and ocean temperature rise due to climate change. Various reports point to the potentially disastrous effects of climate change on the health of our coral reefs and on the downstream industries that can be affected as

a result. Along, with coral reef vulnerability, fisheries are extremely sensitive to changes in the marine environment via climate change. As fishing is a major industry in Trinidad and Tobago, protection of this food source and foreign exchange source will be important.

Where sea and land meet, the dynamics of coastal erosion are complex and prediction can be difficult. That said, evidence is clear that any rise in sea level will ultimately intrude on coastal communities. For instance, the Point Lisas Industrial Estate on the west coast of Trinidad had been developed on some portion of reclaimed land and is now one of the country's major GDP providers. This estate is just above sea level and very vulnerable to sea level rise and extreme tidal variations. In addition to the vulnerability of physical infrastructure, there are indirect economic implications. Protection of this area by means of sea walls or other types of barriers and protective options may be considered. However, the particular option would have to be assessed to avoid costly maladaptation. Relocation inland and/or to higher ground is an option that may have to be considered. The feasibility of this option will depend on impacts on land use as well as the cost of physical relocation. Additionally, this will result in increased population density with the attendant problems of resource allocation and use. Trinidad and Tobago, already a small-island state with limited land and other resources may find difficulty in pursuing this path. In some circumstances the use of sea walls can be an option, but this is extremely expensive and not always very effective.

Forestry

The forest resources are also vulnerable because of unsuitable and unsustainable practices, along with the inherent fragility of the forest ecosystems. This is especially so since the forest soils are highly erodible and susceptible to land slippage. Land demand for habitat and agriculture places further pressures on the forestry sector. As result, unplanned practices that expose bare soil, such as slash-and-burn agriculture, squatting, excessive logging and natural and set fires, cause severe damage to the forest ecosystems, affecting flora and fauna and ultimately the watershed as a whole, which further impacts on the water resource sector. The frequent occurrences of forest fires in the dry season—which are not easily controlled—destroy vegetative cover, rendering the land highly vulnerable to erosion during heavy rainfall events. As a result, silting and flooding in low-lying areas has become more problematic.

Health

The health implications of climate change for Trinidad and Tobago are related to the diverse patterns of negative effects that are likely due to a changing climate tending towards higher temperatures and more erratic rainfall regimes, as are expected in the Caribbean. Increased heat stress may become evident with more high-temperature episodes in future. In addition, with atmospheric humidity expected to increase, the stress of heatwaves on humans will be augmented. This is particularly a concern for the elderly and infirm citizens and for outdoor workers. A further factor is that hot spells are usually accompanied by increased concentration of air pollution in urban areas, causing problems (respiratory, allergic and physiological disorders) especially for children and asthmatics.

Tourism

One of the notable impacts of climate change will be on the growing philosophy of a

tourism-oriented culture being seeded and nursed in Trinidad and Tobago. Stress, in any way, within the islands, will hinder significant developments and strides to be made in this area, since tourists are not likely to travel to places where diseases are prevalent, where water quality is poor, and where beaches and other tourist sites are affected negatively. The concept of product development and product variability, when applied properly, can result in a product that can guarantee a sustained tourist industry. While there are some areas that will be unavoidably more likely to be affected by the changing climate, particularly due to sea-level rise, effective management of those that are more resilient can be developed and promoted.

- **Summary of National Adaptation Programme of Action (NAPA)**

Trinidad and Tobago's climate is tropical and experiences a rainfall of bimodal distribution, with a peak in June or July and a second peak in November. Flooding is a perennial problem within the country, with heavy rains causing overflow of the nation's major river basins. However, compared with many other Caribbean nations, the country experiences relatively few extreme weather events, particularly severe storms and hurricanes.

Trinidad and Tobago's INC to the UNFCCC lists coastal and marine resources, freshwater resources, forestry and land use, and biodiversity as the most vulnerable areas to the impacts of climate change. The recently prepared draft Climate Change Policy (2010) concurs with the conclusions of the National Communication, though also identifies human health and human settlements as additional vulnerable sectors.

Trinidad and Tobago's Initial National Communication discusses its vulnerability to climate change in a number of areas:
Caroni Basin: This area is located between the northern mountain range and the central range of Trinidad and is considered to be highly vulnerable to climate change for the following reasons: it is the most densely populated area of the country and has a significant concentration of biodiversity (coastal mangroves, swamp fringes); the area is already under threat from poor land-use practices, including deforestation of the northern range that has caused flooding in the lower areas of the Basin, as well as siltation and a decline in water resources.

- **Coral resources**: Impacts of climate change on the nation's coastal resources include coral bleaching and subsequent impact on the tourism sector, as well as coastal erosion as a result of sea level rise.
- **Fisheries**: The vulnerability of coral reefs to the impacts of increased sea-surface temperature, as well as increased siltation in Trinidad and Tobago's rivers and pollution is expected to adversely impact aquatic life.
- **Wetlands**: Trinidad and Tobago's wetlands form the habitat of a variety of highly vulnerable species of plants and animals; more than 90 per cent of the wetlands are less than five meters in elevation, making these areas vulnerable to the effects of sea level rise.
- **Agriculture sector**: Although agriculture contributes a small amount of the nation's GDP, it employs approximately 10 per cent of the labour force and is considered particularly vulnerable to the effects of climate change. The sector is vulnerable to changes in precipitation, enhanced evapotranspiration, and the potential impacts of rising temperatures

and other factors on crop yields.

- **Freshwater**: The country's ground and surface water resources may be impacted by changes in precipitation and saltwater intrusion through rising sea levels.
- **Human health**: As temperatures rise and precipitation becomes more erratic, heat stress may increase in prevalence, especially in elderly populations. The effects of climate change may also affect vector-borne diseases.

- **Adaptation Options**

The country's *Draft Climate Change Policy* makes a number of recommendations regarding adaptation, including:

- Strengthening existing institutional arrangements for systematic observation, research and climate change modelling;
- Assess sectoral vulnerability to climate change by conducting vulnerability analyses and formulating adaptation options;
- Revising sectoral policies to include consideration of climate impacts derived from vulnerability analyses;
- Revising national development plans to incorporate climate change vulnerability, impacts, and adaptation options;
- Enhancing the resilience of natural biophysical systems so as to maximize ecosystem services, such as the natural coastal defence properties of coral reefs and mangrove systems; and
- Promoting community-based adaptation through expanded use of the Green Fund for capacity building and enhancing resilience.

5. Key industries and economic activities

Trinidad and Tobago has earned a reputation as an excellent investment site for international businesses and has one of the highest growth rates and per capita incomes in Latin America. Economic growth between 2000 and 2007 averaged slightly over 8%, significantly above the regional average of about 3.7% for that same period; however, GDP has slowed down since then and contracted during 2009-2011.

Growth had been fuelled by investments in liquefied natural gas, petrochemicals, and steel. Additional petrochemical, aluminium, and plastics projects are in various stages of planning. Trinidad and Tobago is the leading Caribbean producer of oil and gas, and its economy is heavily dependent upon these resources but it also supplies manufactured goods, notably food products and beverages, as well as cement to the Caribbean region. Oil and gas account for about 40% of GDP and 80% of exports, but only 5% of employment.

The country is also a regional financial centre, and tourism is a growing sector, although it is not as important domestically as it is to many other Caribbean islands. The economy benefits from a growing trade surplus. The previous Manning administration benefited from fiscal surpluses fuelled by the dynamic export sector; however, declines in oil and gas prices have reduced government revenues which will challenge the new government's commitment to maintaining

high levels of public investment.

6. National development strategy

Trinidad and Tobago's "developed nation" status will be built around five development priorities. The five development priorities that form the planks for the Vision 2020 Draft National Strategic Plan are:

(1) Developing Innovative People

Innovative People are the foundation of a developed society. The government seeks to recognise in this process the importance of individual citizens and their central role in the strategy to develop our nation. They are individuals with unique knowledge, skills and abilities that are facilitated by strong learning systems.

(2) Nurturing a Caring Society

In a Caring Society individuals, groups, communities and institutions are concerned about any activity deemed destructive to human life. They seek to stamp out poverty, discrimination, economic and social marginalisation, diseases and poor health, substandard living conditions and social unrest. This mutual concern enables our diverse society to work collaboratively to resolve disputes amicably, to create new possibilities and to take advantage of existing ones.

(3) Governing Effectively

Effective Government is perhaps the strongest single link to a high standard of living. Without the ability to enter into fair contracts and resolve disputes, businesses and individuals remain averse to risk. Without upholding rights and adhering to basic tenets of justice, disadvantaged or marginalized groups become or remain aggrieved, worsening social tensions. Effective government efficiently employs public resources in activities with high social return encouraging the development of caring societies. When governance is effective, public institutions are strengthened and citizens develop greater respect for authority and the rule of law.

(4) Enabling Competitive Businesses

Competitive Businesses are important to any developed nation. For any sustained increase in the quality of life there must be an increase in productivity and real growth, which can then be translated into higher wages originating from innovation and competition. Our firms will have advanced strategic and operations systems, and will be staffed by a capable, knowledge-based workforce with access to high quality resources. Competitive businesses cannot exist without a demanding consumer base. Additionally, Government is expected to create an environment that allows open and free competition to reign and entrepreneurship and innovation to bloom.

(5) Investing in Sound Infrastructure and Environment

The efficient and safe movement of people and goods in a caring society implies well-built, operated and maintained physical infrastructure and transportation systems. Trinidad and Tobago needs affordable and reliable supplies of water, electricity, telecommunications, postal and wastewater management services if they are to serve the citizens and the business community

effectively. A 2020 Trinidad and Tobago will be further enabled by a leading edge ICT infrastructure. Over time, citizens judge their Governments on their ability to construct and manage infrastructure facilities and services.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.12. トンガ

Tonga

1. Mainstreaming adaptation / mitigation actions in the national development strategy

The island Kingdom of Tonga remains extremely vulnerable to the impacts of climate change. The scarcity of freshwater, susceptibility to tropical cyclones, and the prevalence of low lying coastal areas all contribute to its vulnerability.

Water conservation technologies, water collection schemes and other efforts to implement optimal strategies for a sustainable supply of freshwater must be sought. A creation of a forestry inventory and strengthening institutional as well as public capacity in order to protect forest resources must also be prioritised. For agriculture, the backbone of the economy and export earnings, solutions must be found to counter the effects of climate change induced adversities.

2. Summary on climate change related issues in the country

- **Climate change policy**

Tonga ratified the UNFCCC in July 1998 and the Kyoto Protocol in January 2008. It submitted its initial national communications in May 2005.

Tonga has completed the creation of its National Climate Change Policy, which was approved by Cabinet in January 2006.The policy aims to reprioritize government expenditure to meet the resource requirements for implementing climate change adaptation and mitigation strategies. The policy also identifies the Ministry of Environment and Climate Change (former “Department of Environment) as Agency with the responsibility to coordinate the implementation of the National Climate Change Policy.

The Policy has six objectives, which are as follows:

(1) To amend the existing framework or to endorse the proposed climate change framework;
(2) To mainstream climate change issues into all environmental, social and economic processes including enactment and amending existing legislation;
(3) To improve and strengthen the collection, storage, management, analysis and use of data (including GHG vulnerability & climate data) to monitor climate, sea level change and their effects;
(4) To promote the raising of awareness and understanding of climate change, variability, sea level changes, mitigation, vulnerability and adaptation responses;
(5) To protect the populations, resources and assets, vulnerable areas at risk from climate change impacts;
(6) To mitigate the causes of human induced climate change.

Joint National Action Plan (JNAP) on Climate Change Adaptation and Disaster Risk Management Plan

Other policies put in place include the Joint National Action Plan (JNAP) on Climate Change Adaptation and Disaster Risk Management Plan, approved by Cabinet in September 2010. This plan highlights national and community priority goals with key actions that enable the people and environment of Tonga to adapt to climate change impacts and to mitigate disaster risks.

Six priority goals of this plan are: improved good governance for climate change adaptation and disaster risk management; enhanced technical knowledge base, information, education and understanding of climate change adaptation and effective disaster risk management; analysis and assessment of vulnerability to climate change impacts and disaster risks; enhanced community preparedness and resilience to impacts of all disasters; reliable economically affordable and environmentally sound energy to support sustainable development in Tonga and strong partnerships; and cooperation and collaboration within government agencies and with NGOs and civil societies.

Forestry and Water Policies

The National Forest Policy was also developed between the Government of Tonga, forest sector stakeholders in Tonga, and the Food and Agriculture Organization (FAO) of the United Nations and the German Technical Cooperation (GTZ). The objective of the Policy is to support the sustainable management of forests and trees of Tonga for the benefits of current and future generations of Tonga. Implicit in this objective is the requirement to manage the forests and trees for conservation of biodiversity, soil, water and other environmental values as well as for economic and social benefits. Climate Change mitigation and adaptation were integrated into this Policy.

The National Water Policy was formulated and also one of the outputs under the Tonga- Pacific Adaptation to Climate Change Project. This Policy was approved by Cabinet in September 2011.

- **National efforts / measures against climate change**

Tonga is a non-Annex Party under the UNFCCC and therefore not obliged to greenhouse gas reduction commitments. Tonga has made the effort to reduce its emissions through promoting the usage of the renewable energy resources.

Tonga has not set up a designated national authority and does not have any CDM projects.

3. Sustainable Development and Mitigation

- **National inventory of GHG**

Tonga's Second National Greenhouse Gas Inventory of Anthropogenic Emissions and Removals was published in 2000. Amongst all the GHGs recorded in this inventory, carbon dioxide gas claims the largest share, accounting for 95% of the total.

Carbon dioxide gas was emitted from two source categories, the Land Use Change and Forestry (LUCF) and the Energy sectors (Table 1). About 60.87% of this gas being released from the Land Use Change and Forestry whereas 39.13% being emitted from the Energy Sectors. The principal contributor to the LUCF sector emissions is forest and grassland conversion of biomass. Road transport and energy generation activities were the activities that contributed most to emissions within the Energy Sector.

Non-carbon dioxide emissions

The non-carbon dioxide gas emissions accounted for the remaining 5% of the national totals. About 69.80% of methane gas was emitted from the Agricultural Sector, 26.62% from the Waste Sector and 3.58% from the Energy Sector. The activities that contributed most to emissions within the Agricultural, Waste and Energy sectors were manure management, solid waste and road transport. Nitrous oxide gas was emitted from the Agriculture and Waste Sectors. About 50% of this gas was emitted from each sector. Agricultural soil tillage and human sewage accounted for these emissions.

About 98.30% of nitrogen oxide gas was released from the Energy Sector and 1.70% from the Agricultural Sector. Activities that contributed most to the emission of this gas were Road Transport and prescribed burning of the savannah.

About 94.86% of carbon monoxide gas was emitted from the Energy Sector and 5.14% from the Agricultural Sector. The activities that contributed most to the emission of this gas were Road transport and prescribed burning of the savannah. Non-methane volatile organic compounds and sulphur dioxide gases were only released from the Energy Sector.

Table 1: Carbon dioxide emissions, removals & changes, Tonga, 1994 & 2000.

CO2 emissions & removals (total& by sector)	**1994**	**2000**	**CO2 change**	**% change**
Total GHG emissions	375.73	255.33	-120.40	-32.04
Total CO2 emissions	365.59	242.59	-123.00	-33.64
Total CO2 removals	-595.24	-1977.95		
Net removals/sinks	-229.65	-1735.36		
Sectoral CO2 emissions				
All Energy	79.98	94.93	+14.95	+18.69
Land use change and forestry	285.61	147.66	-137.95	-48.30
Sectoral CO2 removals				
Land use change and forestry	-595.24	-1977.95		

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Tonga has not submitted its NAMA plan.

- **Mitigation Options**

Tonga's emissions are negligible compared to those of the large GHG emitters. However, the country has set its own national targets and strategies to mitigate GHG emissions. There were four sectors identified as sources of GHG emissions in Tonga: Energy, LUCF, Agriculture & Waste Sectors. This GHG mitigation exercise assessed the suitability of a wide range of options /strategies for GHG abatement in these sectors. These strategies were based mainly on the results of the inventory of GHG emissions and removals.

Energy Sector

Table 2: Mitigation Measures/options in Tonga

1. Demand Side Management
(1) Energy Efficiency Labelling
(2) Energy Efficiency Standard
- Refrigerators, freezers and air conditioners must be supported by energy efficient labelling scheme.
(3) Education, Training and Awareness Program
- Focus mainly on lighting, refrigerators, freezers and air conditioners
- Program aims at: correct installation and cleaning; controls to reduce operation while not in use; and selection of correct appliances.
(4) Ground Transport
- Hybrid electric vehicles (HEVs) use a combination of electric and mechanical power to reduce GHG emissions by nearly one-half compared to conventional gasoline vehicles. -Discourage large engine and low efficiency cars, impose high taxes on large engine vehicles, tax company cars, reduce duty on spares, and high fuel taxes. -Converting ligno-cellulosic materials to ethanol for use as a motor fuel. This is one of the few possibilities in the near term to displace fossil fuel in the transportation sector because of existing distribution infrastructure. -Educational programs on maintenance and driving techniques. -Road improvements and maintenance. -Improved traffic management -Encourage emission & standards testing.
2. Supply Side Management
(1) Replacement of fossil fuelled plant by non-fossil fuel systems with low GHG emissions. Increase efficiency in existing systems, particularly power generation and distribution systems through technology shifts.
(2) Fuel switching to less carbon-intensive fuel. Fuel switching from petroleum to natural gas can contribute to reducing CO2 emissions. Switching from fossil fuels to nuclear power can significantly reduce CO2 emissions.

(3) Improvement of conversion efficiency by using advanced fossil fuel based technologies, such as combined cycle or retrofitting inefficient fossil fuel plants. According to IEA statistics, current average power conversion efficiency is around 30%, whereas that of most efficient commercial plants with natural gas combined cycle systems are over 55%.
(4) Improvement of thermal efficiency by use of cogeneration to supply process or district heat. Depending on the circumstances, this can increase thermal efficiency substantially.
(5) Improvement of efficiency of transmission line by increasing busbar voltage and/or using DC. This could improve transmission efficiency up to 10% in some situations. More localized power production will also bring less transmission losses and contribute to local and regional development.
(6) CO2 capture and sequestration from power plants has the potential to substantially reduce CO2 emissions, but more R&D is needed to make it economically viable and assure that environmental impacts are negligible.
(7) Renewable sources of energy can provide energy in the final form required by users while emitting significantly less GHGs than fossil fuels. Carbon emissions are present through the use of fossil fuels during the process of planting, harvesting and storage of the renewable resource and its transformation into a commercial form of secondary energy.
(8) Technology improvements in biomass productivity, harvesting and collection, and conversion are expected to further reduce GHG emissions by: Gasifying biomass as an intermediate step for gas turbine based electricity generation or cogeneration or other high efficiency combined cycle concepts.
(9) Improvement of efficiency by maintenance and modification of existing systems.
3. Fuel Substitution
- Utilisation of fuel cell technology when commercially viable. - Fuel switching to less carbon-intensive fuel. - Replacement of fossil fuelled plant by non-fossil fuel systems with low GHG emissions. Increase efficiency in existing systems, particularly power generation and distribution systems through technology shifts. - Assess the viability of using copra oil.
4. Forestry Industry Development
- Develop sustainable supplies of fuel wood by extending forest area and extensive tree planting.

Agricultural Sector

Methane is still the major GHG emitted from agricultural sector in Tonga's second national GHG inventory as was recorded in its first national GHG inventory. The total CH4 emissions increased from 2.35 Gg (first inventory) to 3.12 Gg (second inventory). Methane emissions were mostly released from enteric fermentation in livestock animals and the remainder from prescribed burning of savannahs.

The potential options to reduce methane production by ruminants are the use of Ionophores (feed additives); the use of probiotics; the use of livestock methane vaccine; improved forage quality; manipulating nutrient composition; implementing a biogas system to generate useful energy; breeding for higher genetic merit animals (lower CH4 emitters); reduce burning of savannahs by short-fallowing the land with the *Mucunapruriens* bean. The Mucuna bean has

been identified by some farmers to smother most agricultural weeds, reduce machinery land preparation and fix nitrogen to the soil.

Land Use Change and Forestry Sector

The Forestry Sector is arguably the most valuable sector with potential to mitigating climate change. Tonga continues to lose forests areas yet no constructive policy directions have been formulated to resolve this critical issue. The government must take initiative to formulate appropriate national policies and establish relevant institutions to cater for the pressing situation.

A national inventory of the natural forest resources is urgently needed for Tonga in order to have reliable baseline resource data for which development policy decisions should be based. Other areas need urgent inventory works include: coastal vegetation, secondary forests, swamp forest, urban forests and trees, and potential cash crops such as sandalwoods and wood carving species.

The forestry sector should contribute directly or indirectly towards reducing Carbon Dioxide emissions or rather sustaining of the current trend of Carbon sink through implementing the following strategies;

⇒ Increase the forest conservations areas
⇒ Promote sustainable forest management schemes
⇒ Promote national tree and forests replanting programs
⇒ Promote efficient and alternative use of wood resources
⇒ Create a reliable national forestry inventory

Waste Sector

The total GHG emissions from the waste sector are relatively low in comparison to other sectors. Past data shows a decrease in the amount of methane gas emitted into the atmosphere between 1994 and 2006.A contributing factor to this includes the decrease in waste generated per person. In addition, the setup and operation of a number of waste services and recycle schemes; workshops and training on setting up home composting; increased number of awareness programmes and solid waste projects; increase in data collection; and political and national support have reduced the volume of waste going into the landfill, which in turn decreased the amount of methane gas emitted.

Table 3: Summary of Mitigation Options

MITIGATION OPTIONS	EFFECTIVENESS	TECHNICAL REQUIREMENTS	APPLICABILITY	COST
SOLID WASTE DISPOSAL				
Waste reduction	High	Low-High (depending on site)	High	Low-Moderate
Waste diversion				
1) Recycling	High (if focused on organic waste)	Low to Moderate	High	Low-Moderate

2) Composting	High (if well managed)	Low	High	Low
3) Incineration	High	High	Low	High
Methane recovery	Moderate - High (may be 50-75% of methane recoverable; require demonstration)	Moderate	Low-Moderate (near term)	Low - Moderate (depending on scale)
Waste management facility	Moderate – High (if well managed)	Moderate - High	High	Moderate – High depending on type)
WASTEWATER TREATMENT				
Waste reduction	Moderate-High	Low-High (depending on site)	High	Low
Waste diversion	Moderate-High	Low	High	Low-High (depend on type)
Aerobic treatment	Moderate-High	Moderate-High	Low-Moderate	Moderate-High
Methane recovery	Moderate-High	Moderate	Low-Moderate (especially in near term)	Low-Moderate (depending on site)

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

The key vulnerable sectors identified include Water Resources, Coastal Areas, Fisheries, Agriculture, Human Health, Human Settlements and Infrastructures.

Water Resources

The three major impacts on Water Resources will be reduced rainfall, increased temperature, increased evaporation and rising mean sea level.

Increased Rainfall

There will be a temporary increase in recharge to groundwater and rainwater in tanks and water supply. Increase in rainfall will increase surface run-offs which subsequently affects the surface water quality which means that availability of sufficient freshwater will be reduced.

Increased Temperature and Evaporation

Temperature increase and rainfall decrease will enhance evapotranspiration from the ground and plants hence exacerbating water shortages. Other implication of temperature increase is also the increased demand on water resources for consumption, cooling and other purposes.

Sea level Rise

A rise in sea level will be indeed problematic particularly in low lying coastal areas. A reduction

in the area of freshwater lens due to land loss is anticipated. Salt water intrusion will be disastrous for it reduces the availability of sufficient fresh water for drinking purposes.

Fisheries

The Fisheries sector is still identified by the Government of Tonga in its Strategic Planning Framework as one of the sectors with good economic potential to contribute to the sustainable development of Tonga's economy. There is diversity of fisheries activities geared towards sustainable economic development which are mainly divided into two areas: Inshore or Coastal Fisheries and Offshore or Oceanic Fisheries. Both areas are vulnerable to Climate Change but Inshore or Coastal areas are more susceptible due to its location, an inter-connection zone between sea and land base sectors with multiple stakeholders.

On a global scale, it is not expected that climate change and climate variability will lead to any significant reduction in fisheries production. However, important changes in the abundance and distribution of local stocks that is of direct concern to Tonga are likely to occur.

Agriculture

Tonga's economy is largely agriculture based, with production heavily dependent on weather, climatic conditions and world commodity prices. Agriculture supports the majority of the population for subsistence and for cash incomes. It also provides employment and accounts for at least fifty percent of the export earnings.

Agricultural crops are mostly root crops (yam, taro, sweet potato, cassava, and giant taro) for domestic consumption; squash pumpkin, vanilla, and kava for export; fruit trees like banana, plantain, and papaya; and crops like pandanus and paper mulberry for handicrafts. Livestock production is also an important industry that is growing in Tonga.

The vulnerability assessment for the agricultural sector is based on the generated climate change trend scenarios: increase temperature and rainfall, rising sea levels, reduced and the chaotic distribution of annual rainfalls, increase and intense occurrence of cyclones and droughts.

(1) Consequences of warmer temperatures are:
- Higher rate of soil fertility decline;
- Elevated GHG levels;
- Loss of cool weathered crops.

(2) Vulnerable to rising sea levels are:
- Farmers and population of low lying coral islands of the Ha'apai and the low coastal areas of Tongatapu group;
- Water for irrigation.

(3) Vulnerable to chaotic distribution of rainfall are:
- Production of seasonal annual crops, perennial fruits and tree crops.

(4) Vulnerable to increase occurrence of cyclones and drought are:

- Farmers and population dependent on mono-crop agricultural system;
- Farmers and population of the eastern soil types, (mainly derived from the older volcanic ash); such as the Lapaha soils of Tongatapu, Houma soils of 'Eua, Foa soils of Ha'apai and Tu'anekivale soils of Vava'u.

- **Summary of National Adaptation Programme of Action (NAPA)**

Tonga has not submitted its NAPA.

- **Adaptation Options**

The main vulnerabilities Tonga has identified relative to climate change are a potential increase in the frequency, duration and/or intensity of tropical cyclones, and sea level rise. Several strategies have been suggested to aid in adapting to potential changes within different sectors:

- Coastal Areas: Building up coastal areas with crushed limestone; relocation; protection of infrastructure against storm events; re-vegetation of coastal areas; elimination of onshore sand mining; fencing domestic animals (hard hooves and foraging for food damage sensitive soils); and coral management plan.
- Fisheries: Monitoring changes; and legislation and regulation.
- Agriculture: Introduction of salt tolerant species; introduction of heat tolerant crops; improved pest and disease management; crop research; restoration of degraded lands; species diversification; and farm relocation.
- Forestry: Land use policy; legislation and regulation; reforestation; promotion for agroforestry.
- Human Health: Research to understand relationship between climate and human health; and standardize health impact assessment procedures.
- Water Resources: Demand management; leakage control; consumer education and awareness; pricing policy; water conservation plumbing measures; alternative water supply; expansion of rainwater collection; groundwater protection; importing water; and desalination of water.

5. Key industries and economic activities

Tonga has a small, open, South Pacific island economy. It has a narrow export base in agricultural goods. Squash, vanilla beans, and yams are the main crops. Agricultural exports, including fish, make up two-thirds of total exports. The country must import a high proportion of its food, mainly from New Zealand. The country remains dependent on external aid and remittances from Tongan communities overseas to offset its trade deficit. Tourism is the second-largest source of hard currency earnings following remittances. Tonga had 39,000 visitors in 2006.

The government is emphasizing the development of the private sector, especially the encouragement of investment, and is committing increased funds for health and education. Tonga has a reasonably sound basic infrastructure and well developed social services. High

unemployment among the young, a continuing upturn in inflation, pressures for democratic reform, and rising civil service expenditures are the major issues facing the government.

6. National development strategy

The vision held by the Government of Tonga is as follows:
“To create a society in which all Tongans enjoy higher living standards and a better quality of life through good governance, equitable and environmentally sustainable private sector-led economic growth, improved education and health standards, and cultural development”.

Fulfilling the vision set out above requires a well-articulated strategic approach to address the Government’s economic growth, social justice, and sustainability objectives, while acknowledging their clear interdependence.

The Government is focused on achieving seven key outcomes that are fundamental to sustained economic growth:

- Facilitate Community Development by involving district/village communities in meeting their service needs
- Support private sector growth through better engagement with government, appropriate incentives and streamlining of rules and regulations
- Facilitate continuation of Constitutional Reform
- Maintain and develop infrastructure to improve the everyday lives of the people
- Increase performance of Technical Training Vocational Education & Training to meet the challenges of maintaining and developing services and infrastructure
- Improve the health of the people by minimising the impact of Non-Communicable Diseases
- Integrate environmental sustainability and climate change into all planning and executing of programs

References
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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.13. ナウル

Nauru

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Nauru is committed to addressing the issue of changing climate and better understanding the mechanisms relating to vulnerability of the Pacific's small island states and therefore considers that the need to remain current and informed with respect to changing climate is of prime importance to Nauru and its future position.

The main climate change vulnerabilities in Nauru are sea level rise and the effect that an increase in temperature will have on marine resources and already stressed water and vegetative resources Department of Islands Development and Industry (DIDI, 1999). Due to environmental degradation, Nauru is already experiencing coastal erosion and declines in the productivity of its coral reef systems. Rising ocean temperatures, sea level rise and an increase in the number of intense storms could cause further damage to these ecosystems (DIDI, 1999).

Nauru also has no significant surface water resources; desalination plants and groundwater are its only drinking sources. Water scarcity is already affecting human health. Greater incidence of drought could therefore reduce the sustainability of the country's groundwater resources, the health of its population, and the persistence of a vegetation ecosystem already stressed from major phosphate mining (DIDI, 1999).

In response to these concerns, Nauru identified education and information activities that have been or should be implemented to support is efforts to adapt to the impacts of climate change.

2. Summary on climate change related issues in the country

- **Climate change policy**

As Nauru's greenhouse gas emissions are limited to a small number of well-defined sectors, the opportunities to reduce these emissions is relatively clear. However, although Nauru's emissions are relatively small, Nauru still remains very mindful of its vulnerability to climate change and the future potential effects predicted as a result of sea-level rise. In consideration of these future potential effects, Nauru has taken a positive approach towards improving its own situation as well as actively participating at both the regional and international levels.

Nauru ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 11 November 1993 and the Kyoto Protocol on 16 August 2001, and submitted their first National Communications Report on 30 October 1999.

Although Nauru has not yet established a specific environmental policy, a no-regrets approach has been adopted to adaptation accommodating climate and sea-level change considerations and

implementation of the National Environmental Action Plan and the Rehabilitation Master Land-use Plan.

- **National efforts/measures against climate change**

The Republic of Nauru adopted its National Environmental Management Strategy (NEMS) and National Environmental Action Plan in September 1997. The NEMS was initiated under the United Nations Capacity 21 Programme and funded by the United Nations Development Programme (UNDP) and the South Pacific Regional Environmental Programme (SPREP). The NEMS maps a return to the idea of stewardship, of looking after the surrounding environment for future generations and provides a mechanism for developing a change of attitude, of caring and nurturing an environmental credo.

The Department of Island Development and Industry (IDI) has participated in training provided through PICCAP in the Vulnerability and Assessment (V&A) programme established as part of the overall climate-change programme. The initial Vulnerability and Assessment training was carried out at the Waikato University in New Zealand during 1998. In 1999 the course was transferred to the University of the South Pacific (USP), Lacaula Bay Campus, Suva, Fiji. Two Nauruans participated in the initial New Zealand course and another two have participated in the Fiji course.

Additional training and assistance has been provided to Nauru in the preparation of their V&A Synopsis, the Greenhouse Gas Inventory and National Communication. This programme provided the opportunity for Nauruan Nationals to participate at international meetings and fora and also to participate in regional training workshops. All these activities have assisted in developing a better understanding of the climate mechanism, and provided a base for the development of the GHG Inventory and preparation of the Vulnerability and Assessment report for Nauru.

The Department of Island Development and Industry is developing a resource room for the use of school students, teachers and interested parties to access and research the extensive range of climate change documents, books, posters, etc., that have been collected. A schools education programme was convened based on the AusAID publications, Curriculum Modules for the Pacific Schools, Climate Change and Sea-level, Part One: Physical Science and Part Two: Social Science.

Nauru has not set up a designated national authority and does not have any CDM projects.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

Greenhouse gas emissions in Nauru in 1994 totalled 19.265 Gg of carbon dioxide.
As this is Nauru's first Greenhouse Gas Inventory a comparison of emission trends has not been possible. However, as the once predominant phosphate mining activity has been gradually decreasing since 1993 it can be expected that the levels of greenhouse gas emissions for Nauru will also have been decreasing over recent years.

It is acknowledged that in the future there are likely to be modifications to the inventory, once the process of determining greenhouse gas emissions is better understood, in particular, appropriate conversion figures for industrial processes such as phosphate extraction and processing which are particularly relevant to Nauru's situation. Due to Nauru's relatively uncomplicated situation the greenhouse gas emissions have focused predominantly around activities associated with the phosphate mining operation and the transport sector.

The Greenhouse Gas Inventory, prepared as a separate report, elaborates on the assumptions made and the constraints encountered in the preparation of this first Greenhouse Gas Inventory for Nauru.

Table 1: GHG Emissions by Sector (Gg)

National Greenhouse Gas Inventory						
Greenhouse gas source and sink categories	***CO_2***		***CH_4***		***N_2O***	
	Gg	%	Gg	%	Gg	%
1. All Energy (incl. transport)	**41.416**					
A. Fuel combustion	28.318	68.37				
B. International bunkers[1]	13.098	31.63				
2. Industrial processes	**NE**		**NE**		**NE**	
3. Solvents	**NE**		**NE**		**NE**	
4. Agriculture			**0.234**	**67.55**		
A. Enteric Fermentation			0.011	3.18		
B. Animal Wastes			0.223	64.38		
5. Land use Change & Forestry[2]	**-9.053**	**-9.053**				
6. Waste			**0.1124**	**32.45**	**0.001**	**100.00**

1. Not included in Nett National Total

2. Uptake (sink) not deducted from "All Energy" and taken as a percentage of "All Energy"

NE = Not Estimated

The volumes of greenhouse gas emissions calculated for Nauru using the reference approach are limited to carbon dioxide, methane and nitrous oxide. The percentages of these gasses are 98.22%, 1.77% and 0.01% respectively.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Nauru has not submitted its NAMA plan.

- **Mitigation Options**

Not specified in the National Communications Report.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

The vulnerability of Nauru to climate and sea-level change will be determined by four main factors:

(1) The magnitude and rate of global climate and sea-level change and how they manifest in Nauru;
(2) The effectiveness with which population is stabilised at a sustainable level within the next fifty years;
(3) The effective implementation of the Rehabilitation Master Land-use Plan over the next 50-100 years;
(4) The effective implementation of the National Environmental Action Plan (NEAP), in particular those objectives that are directly related to a no-regrets adaptation approach as outlined above.

In the physical environment of Nauru, the coastal zone and groundwater resources in particular are likely to be those most vulnerable. Adaptation measures, such as an Integral Coastal Zone Management (ICZM) plan and a water resource management plan, could significantly reduce the vulnerability. However other measures, such as phase out of settlement and important infrastructure on the coastal plain, may become necessary over the next 50-100 years. This possibility highlights the importance of the rehabilitation programme in reducing vulnerability.

- **Summary of National Adaptation Programme of Action (NAPA)**

Nauru has not submitted its NAPA to the UNFCCC.

- **Adaptation Options**

Nauru identified education and information activities that have been or should be implemented to support is efforts to adapt to the impacts of climate change. This adaptation strategy should be founded on the NEAP in conjunction with the Rehabilitation Master Land-use Plan, with particular emphasis on, but not limited to, the following NEAP objectives:

• Objective 1: Land rehabilitation and protection
• Objective 2: Strengthening environmental education
• Objective 3: Strengthening environmental institutions and legislation
• Objective 4: Conservation of biodiversity
• Objective 5: Promotion of the sustainable use of marine resources
• Objective 7: Pollution and waste management
• Objective 8: Control of population and urban growth
• Objective 11: Appropriate infrastructural development

The NEAP presently contains an Objective 12 aimed at addressing and preparing for global climate change and sea-level rise, incorporating programmes on integrated coastal-zone

management (ICZM) and coastal protection (Programme 12.2) and coastal forest protection and reforestation (Programme 12.3). However, it is suggested that all of the above objectives, and in particular these two programmes of Objective 12, are integral to effective implementation of a no-regrets adaptation approach in Nauru. A summary appraisal of these NEAP objectives in terms of adaptation to climate and sea-level change is presented in the table below.

NEAP Objective	**Key priorities and benefits in terms of adaptation to effects of climate and sea-level change**
Objective 1 **:** Land rehabilitation and protection	Rehabilitation and re-settlement of mined areas will decrease pressure on the coastal plain and facilitate development of infrastructure in a less vulnerable location.
Objective 2: Strengthening environmental education	For the NEAP to successfully achieve adaptation goals, there needs to be an increase in public awareness and local expertise in terms of climate and sea-level change and its possible effects in Nauru.
Objective 3: Strengthening environmental institutions and legislation	Climate and sea-level change considerations should be directly incorporated into the proposed Environmental Impact Assessment (EIA) process, land-use planning process, environmental baseline studies and new environmental legislation.
Objective 4: Conservation of biodiversity	Biodiversity plays a key role in increasing the resilience of natural systems to environmental stresses. Biodiversity objectives should include the coastal forest protection and re-forestation programme from Objective 12. This programme could be re-named as the 'Re-forestation and conservation of terrestrial biodiversity programme.'
Objective 5: Promotion of the sustainable use of marine resources	The marine resources objective needs to be enhanced by a programme on protection of Nauru's coral reef systems which are vital for the island. This objective could be renamed 'Promotion of the sustainable management of coral reefs and marine resources.'
Objective 7: Pollution and waste management	Achieving the goals of this objective is vital to the health of the coral reef and marine system and groundwater and would therefore decrease the vulnerability of these systems, the coast and associated infrastructure and communities.
Objective 8: Control of population and urban growth	It is clear that the key to both a sustainable future and reducing vulnerability of Nauru to climate and sea-level change would be an early stabilisation of the Nauruan population. In addition the shift of urban growth from the coast to Topside would reduce vulnerability.
Objective 11: Appropriate infrastructural development	Implementation of the programme for the integrated water conservation and supply management and also the programme for the development of storm-water collection and disposal system for re-use, are critical in terms of adaptation. Objective 11 could be revised to incorporate the possible effects of climate and sea-level change on the infrastructure itself, the effects of infrastructure on sensitive systems and potential modifications of specific value for adaptation.

5. Key industries and economic activities

Revenues of this small island traditionally have come from exports of phosphates. Few other resources exist, with most necessities being imported, mainly from Australia, its former occupier and later major source of support. In 2005 an Australian company entered into an agreement to exploit remaining supplies. Primary reserves of phosphates were exhausted and mining ceased in 2006, but mining of a deeper layer of "secondary phosphate" in the interior of the island began the following year. The secondary phosphate deposits may last another 30 years. The rehabilitation of mined land and the replacement of income from phosphates are serious long-term problems.

In anticipation of the exhaustion of Nauru's phosphate deposits, substantial amounts of phosphate income were invested in trust funds to help cushion the transition and provide for Nauru's economic future. As a result of heavy spending from the trust funds, the government faced virtual bankruptcy. To cut costs the government has frozen wages and reduced overstaffed public service departments. Nauru lost further revenue in 2008 with the closure of Australia's refugee processing centre, making it almost totally dependent on food imports and foreign aid. Housing, hospitals, and other capital plant are deteriorating. The cost to Australia of keeping the government and economy afloat continues to climb. Few comprehensive statistics on the Nauru economy exist with estimates of Nauru's GDP varying widely.

6. National development strategy

The overall impact that the National Sustainable Development Strategy (NSDS) seeks to make is captured in the people’s vision for development and is stated as:

A future where individual, community, business and government partnerships contribute to a sustainable quality of life for all Nauruans

The following long term national goals to achieve the vision are listed below. The components of each goal are listed in priority order.

Stable, trustworthy, fiscally responsible government

- Transparent and accountable governance practices
- Conducive legislative framework
- Efficient and productive public service
- Enabling and cooperative international relations
- Efficient and effective law and order system
- Increased community role in governance

Provision of enhanced social, infrastructure and utilities services

- Broadened educational system
- Alternative (including renewable) energy sources
- Improved access to water

- Preventative health service
- Improved sports and recreation facilities
- Viable social welfare systems
- Well maintained infrastructure

Development of an economy based on multiple sources of revenue
- Phosphate mining
- Fisheries resource management
- A developed SME sector
- Efficient use of resources – people and natural
- Increased job opportunities locally and regionally
- National trust fund

Rehabilitation of mined out lands for livelihood sustainability
- Land for agriculture development
- Land for conservation
- Land for water catchment
- Land for residential development
- Land for commerce & industry development

Development of domestic food production
- Establishment of agricultural production
- Enhance aquaculture farming
- Sustained use of inshore and reef marine resources
- Promotion of pelagic fishery, in particular tuna fishing

The strategies needed to achieve the vision and goals are listed below in priority order.
- Accelerating the rehabilitation of mined out lands based on the land use plan NSDS Champions group working on the strategy
- Building capacities in technical, organisational and financial management
- Investing for Nauru's long term financial sustainability
- Increasing national revenue generation
- Establishing a business environment conducive to broadening the economic base
- Promoting a preventative health focus in the public health system
- Improving the quality and broadening the scope and reach of education
- Fostering a cultural change towards self-reliance
- Strengthening the processes and practices of good governance
- Enhancing Nauru's participation in region-wide initiatives
- Improving access to land for economic development
- Promoting the community's role in development.

References

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4. “Review of Current and Planned Adaptation Action: The Pacific”
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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.14. バヌアツ

Vanuatu

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Vanuatu is an archipelago of over 80 islands stretching 1,300 kilometres from north to south in the Western Pacific Ocean, with a population of around 180 thousand people. Vanuatu is one of the countries in the Pacific region that are most vulnerable to the risks of climate change, climate variability and sea level rise.

In terms of mitigation, measures will be taken to target transport and electricity generation sectors. Adaptation options are envisioned in the fields of agriculture, water management, sustainable tourism, community based marine resource management, and sustainable forestry management

2. Summary on climate change related issues in the country

- **Climate change policy**

Vanuatu ratified the United Nations Framework Convention on Climate Change (UNFCCC) in March 1993 and the Kyoto Protocol in July 2001. The first national communications was submitted in July 1999, and its national adaptation programme of action in December 2007.

Vanuatu has been enabled to meet its national obligations under the UNFCCC through support received through the Pacific Islands Climate Change Assistance Programme (PICCAP), which is a three year programme funded by the Global Environment Facility (GEF). The implementation of PICCAP in Vanuatu commenced with re-formation of the National Advisory Committee on Climate Change (NACCC) in 1997. The NACCC was first established in 1989 to advise the government on matters relating to climate change during the UNFCCC process and draws on expertise within key government departments.

Initial PICCAP activities focused on enhancing the understanding of climate change issues and future scenarios by the NACCC members and key staff within national and provincial administrations.

“A National Response to Climate Change – Strategies for Action” has been developed, in which “Climate change is recognised as a national issue that requires timely and committed initiatives by government to develop capacity to address existing and potential impacts on the livelihood of the people of Vanuatu”. Priorities identified in this action plan include:

- Institutionalise and mainstreaming climate change preparations
- Building national level and understanding
- Improving networks for information transfer and coordinated adaptation and mitigation measurers

- Increase national capacity to prepare for and adapt to climate change
- Minimise increase in National GHG emissions in the medium term
- Increase community understanding of climate change and their preparedness

- **National efforts / measures against climate change**

Since ratifying the UNFCCC, Vanuatu has participated in a number of regional programmes and introduced national policy initiatives that demonstrate its commitment to meeting its responsibilities under the Convention. These include:

- State of the Environment Reporting Programme. A SPREP sponsored initiative to establish a database of relevant environmental criteria for on-going assessment of the state of Vanuatu's environment.

- Vanuatu Sustainable Forestry Utilisation Project and the South Pacific German Forestry Programme. Two project's that are strengthening national capacity to improve forest management. More sustainable logging systems will maintain forest cover and hence minimise carbon loss.

- Pacific Regional Agricultural Programme that is studying and promoting sustainable agricultural systems, reducing the rate of conversion of forests to agriculture.

Vanuatu has not set up its designated national authority and does not have any CDM projects.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

The below table summarises the volumes of GHGs identified by the National GHG Inventory. These emission volumes are low on a global scale: both in terms of total emissions and emissions per capita.

Table 1: GHG Emissions by Sector Gg)

Greenhouse gas sources or sink categories	CO2 Emissions	CO2 Removals	CH4	N2O	NOx	CO
Total Emissions and Removals	56.7078	-1.1534	11.1996	0.0291	0.1369	0.0143
Energy	55.1532		0.0026	0.0291	0.0832	0.0195
Industrial Processes	nr		nr			
Solvents and other Product Use	nr		nr			
Agriculture	nr	nr	11.1981			
Land Use and Forestry	net	-1.1534				
Waste	nr		nr			
International Bunkers Total	4.6001		0.0001	0.0031	0.0102	0.0011
Note: net: emissions netted into removals nr: not recorded						

There are significant gaps in Vanuatu's first GHG inventory due to the lack of relevant statistical data that can be fed into calculation models. Refinements of the quoted emission estimates will require data collection to characterise the use of fire wood; burning of forest, scrub and grassland within subsistence and commercial agriculture, to improve hunting and accessibility; non-commercial forest activities; conversion of land use; waste inventories; and emissions from industry and manufacturing.

Nevertheless it is reasonable to conclude that the energy sector is the major source of GHG emissions in Vanuatu, with emissions dominated by the transport and energy industries. Any efforts to significantly mitigate GHG emissions will appropriately target emissions from these activities. Yet given the national need for human and social development, and the small proportion of the population with good access to transport and energy services at present, emissions are likely to continue to increase for the next decade.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Vanuatu has not submitted its NAMA plan.

- **Mitigation Options**

PICCAP has addressed mitigation measures at a regional level and relevant measures for Vanuatu are considered. To have significant reductions in the national emissions of GHG gases any mitigation measures will need to target the release of carbon dioxide transport and electricity generation sectors.

Mitigation options in the energy sector

(1) Encourage public energy awareness to reduce use of high power consuming appliances.
(2) Ban low efficiency appliances
(3) Improve operating efficiency of vehicles and appliances
(4) Decrease dependency on fossil fuels / increase use of renewable energy alternatives
(5) Impose strict operating conditions on public electricity utilities
(6) Further documentation of GHG emissions to enable better projection and mitigation analysis.
(7) Promote use of fuel wood

Mitigation for land, sea and air transport sectors

(1) Improve efficiency of vehicles, ships and planes
(2) Reduce demand for transport
(3) Land transport
(4) Promote use of public transport
(5) Promote bicycle use and walking

Forest conversion

Mature forests exist in a state of equilibrium and net changes in GHG emissions are only recorded where the standing biomass is increasing (planting of new forests) or decreasing (clearing of forests through burning etc.). Vanuatu remains almost 70% forested, with nonforested lands

primarily used for agriculture, gardening and settlements. In recent years clearing and conversion of forests to agriculture land has been encouraged though government policies and changing economic needs. Preventing further conversion would reduce GHG emissions, but would not be economically or politically possible. Rather promotion of agro-forestry regimes that enable maintenance of standing biomass may be a more appropriate option.

Discussion

Vanuatu is a very minor producer of GHG emissions both in terms of total emissions and emissions per head. Mitigation measures will enable Vanuatu to minimise any increase in its GHG emissions, but due to existing needs for social and economic development, a reduction in releases is not an immediate goal.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

Vanuatu is among countries in the Pacific region that are most vulnerable to the risks of climate change, climate variability and sea level rise. The livelihood of the people and economy which are interwoven, shaped and driven by climate sensitive sectors, the effect of climate and sea level change are already very real and pose a tangible threat to the future socio-economic well-being of Vanuatu.

The following impacts of climate change scenarios are considered.

Agriculture

The impacts of climate change and increased carbon dioxide concentrations on plant growth, productivity and the nutrient value of crops commonly grown in Vanuatu is not understood. However, general knowledge of possible impacts suggest changes may be detrimental to agricultural production and hence national food security.

Human health

There is a high incidence of mosquito borne diseases in Vanuatu, which reduce the productive capacity of human resources. Both climate change scenarios provide conditions that would sustain breeding sites for mosquitoes, and potentially extend breeding seasons. This could increase the incidence of disease, with malaria, dengue and filiarisis of particular concern.

Water resources

Vanuatu has limited surface water and villagers on many islands and residents of both urban areas are dependent of ground water. Increased temperatures are likely to increase the demand for potable water. However increased heat, greater run-off from high intensity rainfall events, decreased rainfall and an associated increase in evaporation could reduce the rate of ground water recharge and decrease surface water flows. Water shortages already apparent in dry seasons would become more pronounced and may require more sophisticated water distribution networks to maintain human populations in severely affected areas.

Any increase in sea level could cause salt-water intrusion into the shallow ground water lens in coastal areas, particularly if ground water recharge was reduced or water over-extracted. This affect would be most problematic in small low-lying islands that are dependent on shallow ground water aquifers.

Coastal environment

National investments in infrastructure and agriculture are primarily in low lying coastal areas around the perimeter of the major islands. The commercial centres of both Luganville and Port Vila in particular are both built on land only a few metres above sea level. The infrastructure and fixed assets of both centres are vulnerable to cyclone damage and associated storm surges, and may be affected by quite small increases in sea level or increased frequency and intensity of tropical cyclones.

Coral reefs

Coral reef systems fringe most islands in Vanuatu. They are important sources of economic and subsistence resources, and a draw-card for the important tourism sector, while protecting adjacent coastlines from extreme sea events.

Reefs are highly vulnerable to the climate change scenarios predicted. More frequent and higher intensity cyclones will cause physical disturbance to reef systems. Meanwhile coral death and bleaching is caused by increased atmospheric concentrations of carbon dioxide and raised sea-surface temperature. Coral morbidity is associated with a decline in productivity of associated fish species, and increased incidence of ciguatera. Both effects would impact on human well-being in coastal areas.

Mangroves, sea grass beds and other near-shore marine ecosystems

Tectonic uplift currently limits the growth of mangrove forests in many areas, as most species present are adapted to a narrow range of environmental conditions. Dead mature mangrove trees can be observed on the land-ward edge of mangrove stands, in areas no longer adequately submerged for their survival. Sea level rise may help mangroves become more stable communities. However negative impacts from more frequent storm surges, decreased salinity during high intensity rainfall events and increased coastal erosion are considered more likely.

Fisheries

The impacts of climate change scenarios on marine fisheries is poorly understood. A range of impacts may be expected. Any rise in sea surface temperature is likely to decrease the amount of available oxygen, increase the growth of aquatic plants and increase the metabolic rates of organisms. The decrease in available oxygen is likely to reduce growth, lower survival rates and increase fish mortality. Changes in sea temperatures will lead to changes in wind and ocean circulation patterns that may impact on the distribution and availability of nutrients and change patterns of migratory and non-migratory fish stocks. Greater extremes of weather may reduce opportunities for fishing during some seasons. Greater extremes of weather may also affect transport services between islands reducing opportunities to market produce.

Socio-economic issues

While there is inadequate climate and economic data to quantify the socioeconomic impacts of climate change the physical effects described above raise a number of concerns:

- Food security
- Water shortages
- Public health
- Damage to public infrastructure and fixed assets
- Cultural concerns
- Negative economic impacts

- **Summary of National Adaptation Programme of Action (NAPA)**

The objective of the NAPA project for Vanuatu was to develop a country-wide programme of immediate and urgent project-based adaptation activities in priority sectors, in order to address the current and anticipated adverse effects of climate change, including extreme events. The project provided an opportunity to facilitate dialogue and consultations designed to identify and elaborate the immediate and urgent adaptation issues and appropriate activities, by conducting a comprehensive assessment of the available and necessary information on Vanuatu's vulnerability to climate change and of the response measures and other activities needed to enhance the resilience of the most threatened parts of Vanuatu's natural heritage, society and economy.

The final list of projects for Vanuatu were determined as follows

- Agriculture & food security (preservation/processing/marketing, modern & traditional practices, bartering)
- Water management policies/programmes (including rainwater harvesting)
- Sustainable tourism
- Community based marine resource management programmes (modern & traditional, aqua-culture)
- Sustainable forestry management

- **Adaptation Options**

Agriculture & Food security

Project Goal

The overall goal of the project is to enhance food security and hence resilience of the economy to the adverse effects of climate change.

Project Objectives

- To facilitate alternative methods of food preservation, processing and marketing by incorporating successful traditional practices with the modern technological methods.
- Develop capacity of local and national governmental and non-governmental organizations to support vulnerable communities in coping with climate variability and longer-term climate change.
- 3. To sensitise communities and decision makers on the potential impacts of climate change on food security.

Sustainable Tourism Development

Project Goal

Enhance adaptation to climate change in the tourism sector for Vanuatu.

Aim

The aim of this project is to further develop and demonstrate adaptation initiatives that will reduce the vulnerability of the tourism sector, and its natural and human resource base, to the impacts of climate variability and change, and in doing so enhance the sustainability of the natural resources and the quality of life of the people of Vanuatu and also generate global environmental benefits. A specific focus of the project is to build and utilize the capacity of Vanuatu to integrate responses to concerns related to climate variability and change into a broader risk management framework, strategy and plan for the tourism sector.

Community based marine resource management programmes

Project Goal

Enhance adaptive capacity and resilience of vulnerable communities to the impacts of climate change.

Project Objective

To develop community based marine resource programmes, embracing both traditional and modern practices.

Sustainable Forestry Management

Project Goal

To mainstream climate change issues in the country's sustainable forest management policies and practices.

Project Objectives

Objective 1: Strengthen the capacity of the forestry sector and other key players for adaptation policy, planning and implementation

Objective 2: Demonstrate how climate change adaptation by the forestry sector contributes to national sustainable development.

Objective 3: Contribute to wider national and international understanding of climate change adaptation policies and measures by documenting and disseminating the success factors, lessons learned and barriers, as well as good practice guidelines for replication and upscaling.

Integrated Water Resource Management

Project Goal

Enhanced resilience of watershed through integrated water resource management.

Project Objectives

The objective of the project is to reduce vulnerability to the anticipated impacts from climate change on the country's water resources, with a primary focus on watershed areas. Specifically, the project seeks to identify national policies to address the impacts of climate change on water resources at the national level and to specifically formulate and implement pilot adaptation actions and specific measures in representative systems in order to protect their environmental functions and their rich biodiversity from climate change related impacts.

5. Key industries and economic activities

Vanuatu's economy is based primarily on small-scale agriculture, which provides a living for about two-thirds of the population. Fishing, offshore financial services, and tourism, with nearly 197,000 visitors in 2008, are other mainstays of the economy. Mineral deposits are negligible; the country has no known petroleum deposits. A small light industry sector caters to the local market. Tax revenues come mainly from import duties.

Economic development is hindered by dependence on relatively few commodity exports, vulnerability to natural disasters, and long distances from main markets and between constituent islands. In response to foreign concerns, the government has promised to tighten regulation of its offshore financial centre. In mid-2002, the government stepped up efforts to boost tourism through improved air connections, resort development, and cruise ship facilities. Agriculture, especially livestock farming, is a second target for growth. Australia and New Zealand are the main suppliers of tourists and foreign aid.

6. National development strategy

The Vanuatu government does not have a National Sustainable Development Strategy (NSDS) per say. However, the National Priority Action Agenda (PAA) includes sustainable development of Vanuatu's Forest and Marine resources. The PAA states that sustainable development as an important prerogative for all sections of Vanuatu Society. Human resource development is tagged as the key to sustainable development in Vanuatu by the PAA.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.15. パプア・ニューギニア

Papua New Guinea

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Although the GHG emissions of Papua New Guinea (PNG) are relatively insignificant, PNG can be severely affected by the impacts of climate change as it has a long coastline of over 17,000 km and 600 islands, most of which are low lying. With almost 2,000 coastal villages with a population of about 500,000, PHG is vulnerable to sea level rise and other weather related manifestations of climate change.

As such, PNG's adaptation actions are in the areas of coastal and marine environment, fisheries, agriculture, land use change and forestry, biodiversity, water resources and health. Important mitigation options are in the field of energy, forestry, transport and waste.

2. Summary on climate change related issues in the country

- **Climate change policy**

Papua New Guinea (PNG) ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1993, and ratified the Kyoto Protocol in March 2002. PNG submitted its initial national communication under the UNFCCC in November 2000.

The Office of Environment & Conservation (OEC) provides policy advice and technical advisory support for the sustainable development of key sectors such as coastal and marine ecosystems, water resources, agriculture and forestry; health and fisheries, while implementation of policy measures has been devolved to the provinces.

The policy development goals in the area of climate change are considered in the fields of coastal and marine areas, water resources, agriculture and forestry, health and fisheries.

- **National efforts / measures against climate change**

The environmental legislation of PNG provides for environmental planning measures to be included as an integral component of project planning for developments with significant environmental risk. Specific areas covered by the legislation include mechanisms for licensing of contaminants discharged into the environment as well as planning and regulating the use of water resources. An Environmental Bill, still in draft form, provides statutory tools, procedures and processes to enable local and provincial governments to formulate by that are within the object of the Act. Environmental codes of practice and guidelines provide a means to define practices for specific sectors, including hydrocarbon storage, oil palm processing, roads and bridges, landfill and sewage.

Policy measures that are considered are:

- Increased outsourcing of conservation initiatives and some responsibilities to NGOs and local communities.
- Strengthening of the OEC through training of staff, review of the various Acts, design of policy guidelines for environmental monitoring and legislation and enforcement processes.
- Development of specific policies such as the National Environment and Conservation policy, NGO - OEC Partnership policy, which aims to guide cooperation between the two parties in order to maximize benefits to landowners. The National Biodiversity Strategic Action Plan and PNG BioNET research programmes, which are aimed at protecting and using plants and animals on an ecologically sustainable basis should be promoted and supported.
- Enactment of the Environment Bill.
- Introduction of a moratorium on all new forestry licenses, extensions and conversions and to review all existing licenses, that logging practices are carried out in a sustainable way and that all landowners get their fair share of benefits from resource use.

The Office of Climate Change and Development is the designated national authority of PNG, and it has five registered CDM projects, including one geothermal project and four on methane capture from palm oil mill effluent. PNG also has one Programmatic CDM project targeted in multiple countries. The project aims to reduce greenhouse gas emissions from palm oil mills by capturing the biogas generated in the wastewater treatment systems.

3. Sustainable Development and Mitigation

● National inventory of greenhouse gas

The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories was used to undertake the inventory and a "reference approach" was followed. It is based on the information sought from a number of sources from government, non-government and private sectors. The inventory covers emissions of carbon dioxide (CO2), Methane (CH4) and oxides of nitrogen (N2O) as guided by Decision 10/CP.2. The reference year for these inventories is 1994.

For PNG the inventory only covers four of the six categories of emission sources and sinks, namely, energy, industrial processes, land use and agriculture. There is no existing methodology for estimating emissions from solvents and other product use and therefore were left out of the inventory. Limited data are available for emissions and removals from land use change and forestry and waste and thus being left out of the inventory. The reported emission figures thus should be taken as “work in progress” since only three categories of emissions are reported here.

Table below provides a summary of the results of the GHG inventory on the four sources of GHG emissions.

Table 1: Greenhouse gas inventory summary for 1994. All data are presented in gigagrams (Gg).

Greenhouse Gas Source/sink categories	**CO2**	**CH4**	**N2O**
All Energy	947.57	X	X
Industrial Processes	193.0	X	X
Agriculture		4.27	12.20
Land Use Change & Forestry	413.0	X	X
Totals	**1,553.57**	**4.27**	**12.20**

The results reflect an underestimation of the emissions of GHGs, as there exists serious data gaps in emissions inventory and not all energy sources have been accounted for in this inventory. Emissions from waste, land-use change and forestry and solvents need to be included in the inventory so that comprehensive emissions total can be obtained. Agriculture emissions mainly focused on domestic livestock, but no attempt has been made to estimate emissions from soil cultivation and from burning of forests and grasslands, since there are no data from such sources or if available were not accessible.

In future, the estimation of emissions and removals from land use change and forestry will be critical due to its potential for offsetting GHG emissions from other categories of sources.

Petroleum is a major export earner for the country and at the same time PNG continues to import fossil fuel to meet its energy requirements. Natural gas reserves have been identified and large potential for its financial gains with the large emissions of carbon dioxide is expected. The main source of fuel combustion is derived from energy and transformation industries, transport, and residential sectors.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Subject to the certain conditions, PNG seeks to:
(1) Increase GDP per capita more than 3 times by 2030;
(2) Decrease GHG emissions at least 50% before 2030 while becoming carbon neutral before 2050;
(3) Increase adaptation investments per annum by $80-$90 million to reduce expected losses by $230-$250 million.

Preliminary and Conditional Nationally Appropriate Mitigation Actions and Adaptation Investments is shown in the table below.

Table 2. Preliminary Climate Compatible Development Plan: Actions and Objectives

High-Level Policy Objectives	**Est. 2010***	**BAU 2030***	**Objectives of Policy or Action**
1. Sustainable Growth	$,1000	$3,000	Increase GDP / capita by more than 3 times by 2030

2. Emissions Reductions	82 – 99	99 - 141	Decrease GHG emissions by at least 50% by 2030 (75% technically possible subject to enabling finance)
			Carbon Neutral before 2050
3. Adaptation Investments			$80-90m investment required to reduce expected loss by $230-250m
Appropriate Mitigation Actions			
1. Forestry	50 – 52	53 - 64	26 – 32
2. Agriculture	25 – 38	31 - 58	15 – 27
3. Oil and Gas	0.4 – 0.6	5.3 – 7.5	5.1 – 7.3
4. Transportation	1.6 – 2.4	3.3 – 4.5	2.8 – 3.8
5. Power Generation	0.3 – 0.5	1.4 – 2.0	0.2 – 0.8
6. Mining & Fire	5	5	2.5
Total	*82 – 99*	*99 - 141*	51 – 73
Adaptation Investments	**Expected annual loss**		**Costs and benefits of counter-measures**
1. Coastal Sea Level Rise	$20m	$90-100m	$35-40m p.a. to reduce expected loss by $80m
2. Inland Flooding	$10-15m	Tbd	Tbd
3. Malaria	$130m	$210-250m	45-50m p.a. to reduce expected loss by $150-170m
4. Agricultural Yield Change	N.a.	Tbd**	Tbd
5. Coral Reef Damage	N.a.	Tbd***	Tbd

* Mt CO2e/year, unless otherwise noted.

** A 10% reduction in agricultural yields would reduce agricultural output by $120 - 150m; research is needed into the expected loss.

*** Coral reefs contribute approx. $170m to the economy now and this could increase to $700 - 900m by 2030, expected loss tbd.

- **Mitigation Options**

In Papua New Guinea, the options to use forests as a major sink is quite obvious, with large tracts of forests still intact and the potential for establishing reforestation and afforestation needs to be explored. The use of intact forests for mitigation GHG emissions would also enhance PNG's approaches to conserving its unique and very rich biological diversity. Similarly, the options for use of biomass, biogas, hydro-power, etc., from the available resources in the country needs to be considered.

Presented in the below list are some important mitigation options in the energy, forestry, transport and waste that have been identified. However, no analysis of mitigation option

measures were not done due to lack of data. Some activities/programmes are currently being implemented to reduce GHG emissions and to cope with the climate change and extreme variability signals. The government (provincial), landowners and private groups ought to assess the potential of these mitigation options and develop them as programmes for the country.

Energy

- Promote the widespread use of renewable energy and the efficient use of conventional energy.
- Encourage agencies involved in agriculture, fisheries, trade and industry to develop programmes that address fuel import replacement.
- Incentives such as duty free privileges, tariffs and tax exemptions for pioneering industries
- Facilitate the development of Emission GHG Factors Lowering energy consumption through demand-side management energy efficiency and conservation programmes
- Policy/regulations to incorporate climate change and Variability
- Data centralized for future GHG Inventories
- Equipment and/ Technology supply

Transport

- Introduce Tax incentives to all petroleum and size of vehicles
- Need to create subsidies for public transport systems
- New policies/regulations must be introduced for engine sizes and ban vehicles with high emission levels
- Technology and Equipment Transfer
- Training and education and awareness

Forestry

- Introduction of Tax incentives
- Subsidies for Forestry sectors
- Policy and Regulation on forestry
- Research and Development
- Integrated Forestry Management Approach (Agro-forest Management)
- Carbon Sequestration Initiatives

Waste

- Raise priority of waste management
- Revise waste management legislation and guidelines, particularly for hazardous waste
- Strengthen environmental monitoring and enforcement
- Improve waste conservation infrastructure
- Initiate education on recycling, composting and waste reduction programs
- Identify waste site areas
- Education, Training and awareness
- Integrated Waste Management

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

Coastal and marine environments

PNG coastline, coastal villages and rural coastal population are vulnerable to sea level rise and other weather-related manifestations of climate change. The main impacts will be inundation of coastal wetlands and foreshore areas, bleaching of corals, which will weaken the coral reefs as barrier protection systems. Loss of wetlands, freshwater sources due to seawater intrusion, and lands may eventually lead to displacement of communities, resulting in aggravated future social problems.

Fisheries

The levels of fishing effort and fish behaviour are directly affected by the weather and sea surface temperatures. However, the impacts will be complicated by the presence of anthropogenic factors. Climate change will have the greatest effect on fisheries that are already stressed, for example, through overexploitation and over capacity. Most of these impacts can be identified, but not readily quantified or predicted.

Biodiversity

Any changes to the natural systems will greatly affect the country's unique and very rich biodiversity. For example, aspects of the life histories such as length of hibernation, preferred niches, etc. of various biota may be different from that in the absence of climate change, but to what extent is unclear.

Water Resources

Vulnerability to water resources is induced by changes in climatic conditions such as increases in temperature, rises in sea level and depletion in carbon dioxide gas. For example, increased CO_2 concentration would reduce stomatal conductance in many plants, implying a reduction in transpiration although the effects vary considerable between species. These changes are likely to upset the overall normal water availability, water balance and hydrological cycle.

Health

The impacts of climate change on health can be classified into three categories:

- Direct impacts on human safety: where storms can damage and destroy health centres and related infrastructure, thereby disrupting essential health services. For example, severe cyclones have destroyed services in the areas of Milne Bay province with marginal areas of Northern and Central Provinces also affected to some degree.
- Nutritional related disease arising from malnutrition and food shortages, especially where subsistence crops and fisheries are affected. For example, prolonged heavy rains and flooding in low-lying areas or wetlands of the Western and Sepik provinces as well as many parts of the country has resulted in mass migration inland, or away from the affected areas.
- Indirect effects such as increases in the incidence of vector borne and other diseases where intense droughts and cyclones disrupt water supplies and sanitation systems. Malaria is associated with a broad range of habitat, an optimum temperature above 22C and an altitude of less than 670 meters. Vulnerable areas are the Kikori and Sepik plains, Star Mountains

and some parts of New Britain.

Land Use Change

Although forestry is of major economic value to the country, excessive logging in agricultural areas has a major environmental impact and has the potential to affect agriculture. Should this happen, there would be increased danger of erosion of fertile land, lowering of the water table in underground reserves, and exposure of river banks to flooding/overflowing during monsoonal rains.

Agriculture

The vulnerability of crops to climate change may either be increased or diminished by future technological changes. If technological advances narrow the optimal range of input conditions for agricultural production (e.g. need for high levels of fertilizer), and if climate change results in increased variability such as increases in frequency of droughts as well, production risks may also be expected to increase.

Forestry

Changes in temperature may affect the formation of cloud forests, which occupy a very narrow geographical and climatological niche. A slight shift in temperature or precipitation patterns could cause this zone to shift upwards enough to be eliminated.

- **Summary of National Adaptation Programme of Action (NAPA)**

PNG has not submitted its NAPA.

- **Adaptation Options**

PNG has not submitted its NAPA. However, a number of adaptation priorities have been identified to reduce vulnerability to the anticipated impacts from climate change in the National Communication Report.

Sectors	Mechanism
Coastal and Marine Environments	✓ Coastal management policy and planning ✓ Integrated Coastal Management ✓ Community based monitoring and management ✓ Integrated research ✓ Building capacity in provincial and national government agencies ✓ Hard and soft measures
Fisheries	✓ Adaptive management ✓ Develop aquaculture ✓ Reduce post harvest losses ✓ Stronger regional collaboration for management and research ✓ Data collection systems ✓ Fish and marine reserves

Agriculture, Land Use Change and Forestry	✓ Micro credit and small business expansion. ✓ Research into new plant varieties, crop rotation, use of irrigation, altered nutrient levels and plantation forestry alternatives. ✓ Sustainable natural forest management ✓ New technologies ✓ Capacity Building ✓ Woodlot establishment, agroforesty and tree planting supported by active forestry extension.
Biodiversity	✓ Slow biological invasions ✓ Strengthen and enforce policies that protect critical habitats ✓ Research into the local effects of climate variability and change on species ✓ Increase awareness of visitors and the public concerning the value of species and biodiversity ✓ Maintain gene pools through a system of connected protected areas ✓ Strategic policy
Water Resources	✓ Invest in new water technologies, particularly for recycled water. ✓ Encourage integrated water management approaches ✓ Incorporate climate change into water management legislation ✓ Transfer of new technology to assist with water projects/ activities ✓ Improve resources information and monitoring ✓ Develop alternative water sources such as rainfall catchment devices as well as saltwater and brackish water desalination plants ✓ Water conservation measures including leakage control ✓ Water carting ✓ Runoff and precipitation retention ✓ Training ✓ Redistribution of water resources
Health	✓ Control vector borne diseases ✓ Reduction in heat stress through infrastructure improvement including adoption and enforcement of more stringent building codes ✓ Comprehensive disaster management programmes ✓ Preventative health care through public awareness programmes Improve medical services Improve quarantine services

5. Key industries and economic activities

The PNG economy has a small formal sector, focused mainly on the export of natural resources, and an informal sector, employing the majority of the population. Agriculture provides a subsistence livelihood for 85% of the people. Mineral deposits, including copper, gold, and oil, account for nearly two-thirds of export earnings.

Natural gas reserves amount to an estimated 227 billion cubic meters. A consortium led by a major American oil company is constructing a liquefied natural gas production facility that could begin exporting in 2014. As the largest investment project in the country's history, it has the potential to double GDP in the near-term and triple Papua New Guinea's export revenue.

6. National development strategy

Guided by the directives and goals of the National Constitution, the Papua New Guinea Development Strategic Plan (PNGDSP) elaborates how PNG can become a prosperous, middle income country by 2030. The directives and goals of the Constitution form the broad objectives of PNG's Development Strategic Plan in the following ways.

Integral human development

Integral human development is essential to provide all citizens with the opportunity to achieve their potential. Quality education for all and a world class health system are key elements of the PNGDSP for human development, helping to develop a highly skilled workforce and equipping PNG's entrepreneurs with the skills they need to grow their businesses.

Equality and participation

All citizens should have equal opportunity to participate in and benefit from the nation's development. Prosperity in rural areas of PNG is a major emphasis of the PNGDSP, because the vast majority of citizens live in rural PNG. The PNGDSP specifies how service delivery to rural PNG will be achieved, including transport services, electricity, education, health and business assistance.

National sovereignty and self reliance

PNG's national sovereignty will be strengthened by PNG's economic and political success. Good governance and broad based growth will help build PNG into a prosperous nation including by facilitating PNG investors. Among other things, PNG's prosperity will alleviate the country's reliance on aid.

Natural resources and environment

PNG is well endowed with a wealth of natural resources. These resources must be managed sustainably to ensure they benefit both future and current generations. In particular, resource revenues need to be focused on nation building, while at the same time protecting the environment.

Papua New Guinea ways

PNG has a rich heritage of traditional wisdom and knowledge, reflecting the greatest cultural diversity of any nation of the world. PNG's development will be fostered in ways that learn from and build upon PNG's cultural heritage. The PNGDSP policy measures for law and order, land, education and health, for example, draw on PNG ways to improve the effectiveness of service delivery in these sectors.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.16. パラオ

Palau

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Being a small island state, Palau's greenhouse gas emission is insignificant and was in fact a carbon sink in 1994. Yet, Palau is highly vulnerable to the adverse effects of climate change, including, increased drought and storm activity, extreme high tides, sea level rise, coastal erosion, habitat fragmentation, sea surface temperature rise, and coral bleaching.

In response, Palau has identified a number of potential mitigation/adaptation actions in the areas of energy supply and demand, promotion of carbon sinks, waste management, water, agriculture, coastal systems, marine resources, forestry, human health and policy and planning.

2. Summary on climate change related issues in the country

- **Climate change policy**

Palau ratified both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol in December 1992. Palau submitted their first Nation Communications Report in December 2002.

One of the most important components of national initiative for effective implementation of no -regrets adaptation options, is the development of a national policy framework for adaptation.

Such a framework should be explicitly designed to ensure that implementation of no-regrets adaptation measures are incorporated in development planning. Some of the key priorities for inclusion in a national policy framework and as mechanisms through which adaptation options could be implemented would be:

(1) An integrated watershed management plan.
(2) An integrated coastal zone management (ICZM) plan.
(3) A complementary land use plan to support both of the above.
(4) A Disaster Management and Preparedness program which includes climate change adaptation.
(5) Effective environmental and social impact assessments for all development policies, projects and plans.
(6) Establishing a National Climate Change Vulnerability and Assessment group with clearly defined roles.
(7) Establishing an effective monitoring mechanism to coordinate national resource surveys, develop indicators and monitoring programs, and consolidate the involvement of stakeholders in terms of data collection and information dissemination.

- **National efforts / measures against climate change**

Palau's First National Communication to the UNFCCC was developed with the assistance of the Global Environment Facility (GEF) Enabling Activity project.

The project was initiated in January 2001 and entailed a series of community workshops and a national symposium to: 1) create public awareness regarding the causes of climate change and its impacts on Palau; 2) conduct a greenhouse gas inventory for the period of 1994 to 2000; 3) execute a vulnerability and adaptation assessment to determine the affects of climate change on Palau, identify high areas of vulnerability, and develop a mitigation and adaptation framework to address projected climate change trends; and 4) prepare the Republic of Palau First National Communication to the UNFCCC.

Palau has not set up a designated national authority and does not have any CDM projects.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

Table below shows the estimated emissions of GHGs by Palau in 1994. Emissions of CO_2 by the energy, agriculture, and land-use sectors were substantially offset by removals associated with changes in stocks of forests and other woody biomass.

Table 1: GHG Emissions by Sector (Gg)

		Carbon Dioxide (Gg CO_2)	Methane (Gg)	Nitrous Oxide (Gg)	Nitrogen (kg)	NMVOC (Gg)
Energy		82.11				
Industrial Processes						0.195
Agriculture		3.48		0.02	180.6	0.046
Land-Use	Removals	-424.03				
	Emissions	6.84				
Waste			0.55	<0.01		
Total		**-331.6**	**0.55**	**0.02**	**180.6**	**0.241**

Palau's Greenhouse Gas Inventory shows that Palau was a carbon sink in 1994, meaning that Palau retained more carbon in its forests and vegetation than it emitted during that year. The National Greenhouse Gas Inventory also illustrates that Palau is a minor emitter of greenhouse gases, in both a relative and absolute sense. Consequently, any steps taken to reduce its greenhouse gas emissions, and enhance its carbon sinks, will have a negligible effect on the enhanced greenhouse effect and global warming.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Palau has not submitted its NAMA plan.

- **Mitigation Options**

GHG mitigation options for Palau are described below.

Energy Demand Use

As Palau imports all its energy supplies from overseas, and due to Palau's growth combined with its economic isolation makes large-scale mitigation options difficult at best. However, mitigation measures related to energy consumption in Palau can be subdivided into demand side and supply side options.

Demand side:

- Energy efficient products
- Training programs
- Building codes

Supply side:

- Alternative energy options (wind energy, PV, fuel substitution, energy from waste, biomass, ocean thermal energy)
- Reconditioned vehicles

Promotion of Carbon Sinks

New (i.e. incremental) tree growth has the potential to provide greenhouse gas mitigation through the use of wood as a cooking and industrial fuel and through increases in the standing biomass.

The inventory data collected and analyzed over time should provide an opportunity to quantify the extent to which land use changes and changing use of fuels for Custom in Palau are contributing to net increases or decreases in atmospheric greenhouse gas concentrations. Though the magnitude of the resulting changes will inevitably be small from a global perspective, the findings may well be instrumental in setting national policies, and implementing plans that achieve larger reductions in global net emissions.

Solid Waste Management

Developing an integrated waste management system incorporating CH_4 recovery from landfills is an option that may be used to mitigate GHG emissions. Not only will the development of an integrated waste management system aid the Republic in the reduction of solid waste and facilitate the recovery of CH_4, but will also aid in alleviating undue stress to the natural environment, decrease pollution, and decrease health related problems derived from improper waste management.

Coral Reefs

Palau's coral reefs supply an abundance of food, building materials, and protect the islands from wave action. Palau's coral reefs are also known as same of the most biologically diverse marine

habitats in the world and are a major component in its tourism product mix. In addition, studies have shown that healthy reefs are also a natural sink for carbon dioxide.

In order to reduce the anthropogenic and natural stresses on the reefs of Palau, measures need to be taken to reduce fishing and recreational diver impacts, diminish or ban coral dredging, ensure untreated solid waste is not discharged onto the reefs, and most importantly, reduce the amount of sediment/runoff produced from poor land-use practices.

Capacity Building

Analysis conducted during the first National Greenhouse Gas Inventory suggest that the priority areas relate to ensuring that the necessary information is readily available and there is the required expertise to process and analyze it is limited. A close second would be improved methodologies, especially with respect to their applicability to the circumstances, needs, and capacities of Palau.

Improved information acquisition and management systems must be an integral part of the national information gathering procedures, operating under that authority and in a way that ensures consistency and completeness in the records.

4. Adaptation and Vulnerability

● Vulnerability to climate change

The Pacific Islands region is already experiencing disruptive changes, consistent with many of the anticipated consequences of global climate change, including:

- extensive coastal erosion;
- coral bleaching;
- persistent alternation of regional weather patterns;
- decreased productivity in fisheries and agriculture - higher sea levels are making some soils too saline for cultivation of crops such as taro and yams;
- coastal roads, bridges, foreshores and plantations suffer increased erosion, even on islands that have not experienced inappropriate coastal development;
- recent devastating droughts have caused severe crop damage and serious water shortages in many pacific island countries; and
- more widespread and frequent occurrence of mosquito-borne diseases.

Palau is already experiencing the adverse effects of the current, large inter-annual variations in oceanic and atmospheric conditions and also encountering impacts that are consistent with the anticipated effects of climate change and sea-level rise. The following sectors are identified as being particularly sensitive to climate change.

- Coastal margins, including lagoons, reefs, marine ecosystems and fisheries;
- Freshwater and terrestrial ecosystems;
- Water resources;
- Agriculture and forestry;
- Tourism;

- Communities and human health; and
- Infrastructure.

- **Summary of National Adaptation Programme of Action (NAPA)**

Palau has not submitted its NAPA.

- **Adaptation Options**

Palau has not submitted its NAPA, but the following adaptation options which strongly overlap with best practice in sustainable development are suggested, in the National Communications Report.

Agriculture

The uses, potential uses, and the preferred growing environment of tree and plant species should be identified and documented. An effective adaptation strategy would be to develop a format plan related to the use of plants and trees, and to selectively plant species that are best suited to a particular physical environment, and which have a particular use.

Where agriculture is practiced in vulnerable, low-lying areas, the breeding and introduction of salt-tolerant root crops is seen as an effective measure. Alternatively, different cultivation practices might have to be considered, such as the use of irrigated, raised-bed systems.

Coastal Systems

Enhanced protection and reducing anthropogenic stresses on mangrove areas and sensitive coral reef systems is an effective means to ensure these systems can better cope with impacts arising from climate change and sea level rise. Such progress would help maintain the natural storm and erosion protection these systems offer and also help sustain their productivity.

Integrated catchment and coastal management planning would produce a variety of outcomes that collectively increase the resilience of coastal systems.

Living Marine Resources

The development and extension of marine breeding and restocking programs, for both fish and corals, are an effective means of increasing the resilience and sustainability of inshore marine resources. Similarly, further expansion of marine reserves and other conservation instruments would help protect subsistence fish stocks and coastal marine resources. Creating new and expanding currently existing reserves would enhance the ability of marine resources to withstand the added stresses arising from climate change. Such measure will increase the resilience of the marine ecosystem and can reduce overall anthropogenic impacts on marine resources.

Biodiversity

Conservation of biodiversity is considered to be viable, no-regrets adaptation measure. It should be associated with a sharpened recognition of the values of both marine and terrestrial flora and fauna. Emphasis should be given to further the development of the Marine Protected Areas Network as well as the National Protected Areas.

In light of the uncertainties associated with climate change, community based forest conservation projects can improve the resilience of managed and natural forest systems. Forest management should place a high priority on land and soil conservation, water conservation, nature conservation, wood production, and the quantity of the human living experience. in this way there will be added resilience to the effects of global warming. The introduction and enforcement of appropriate legislation and policies for the conservation and sustainable use of living resources will also enhance the ability to adapt to climate change.

Water Resources

Improved management and maintenance of existing water supply systems is a high priority response measure, due to the relatively low costs associated with reducing system losses and improving water quality.

Centralized water treatment to improve water quality is considered viable for most urban centres, but at the village level it is argued that more cost effective measures need to be developed. User pay systems may have to be more widespread.

Catchment protection and conservation are relatively low cost measures that would help ensure that supplies are maintained during adverse conditions. Such measures would also have wider environmental benefits, such as reduced erosion and soil loss and maintenance of biodiversity and land productivity. Drought and flood preparedness strategies should be developed and strengthened, as appropriate, including identification of responsibilities for predefined actions.

Human Health

Public awareness programs related to malaria, dengue fever, and other diseases are an essential, low-cost method for reducing the public health risk. Such programs have already been initiated and are considered to be relatively effective, as is the use of bed nets and mosquito screens.

Housing

Measures to “typhoon-proof” houses and other buildings have been identified as desirable. This would include consideration being given to both structural design and the materials used in construction.

Reductions in heat stress and discomfort may be achieved through the planting of shade tress and by building houses with improved insulation and ventilation. Air-conditioning is not considered to be viable, cost-effective response, in general.

5. Key industries and economic activities

The economy consists primarily of tourism, subsistence agriculture, and fishing. The government is the major employer of the work force relying heavily on financial assistance from the US. The Compact of Free Association with the US, entered into after the end of the UN trusteeship on 1 October 1994, provided Palau with up to $700 million in US aid for the following

15 years in return for furnishing military facilities. Business and tourist arrivals numbered 85,000 in 2007. The population enjoys a per capita income roughly 50% higher than that of the Philippines and much of Micronesia. Long-run prospects for the key tourist sector have been greatly bolstered by the expansion of air travel in the Pacific, the rising prosperity of leading East Asian countries, and the willingness of foreigners to finance infrastructure development.

6. National development strategy

The vision for development in Palau is:
To substantially enhance the quality of life of Palauans and future generation of Palauans

The key development goals which are necessary to achieve this vision are to:

- increase real economic growth per capita on sustained basis;
- share the benefits of economic growth on an equitable basis; and
- enrich and enhance confidence in the Palauan culture, raise national consciousness, and protect the natural environment of Palau.

An important element is the development of a partnership approach with the private sector, one in which the Government establishes a policy framework that helps and encourages private sector initiatives.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.17. バルバドス

Barbados

1. Mainstreaming adaptation/mitigation actions in the national development strategy

Barbados, a low-lying small island state and a minor contributor to global GHG emissions, is extremely vulnerable towards impacts of climate change. Its main industries, tourism and sugarcane production can be severely affected by rising sea level and increase in climate events.

As such, Barbados' climate change action is focused on building climate resilience, such as coastal zone management and water management. At the same time, potential mitigation options are also identified in the areas of promotion of renewable energy and efficient use of energy to contribute both to GHE emission reduction and decreasing dependency on imported fossil fuel.

2. Summary on climate change related issues in the country

- **Climate change policy**

Barbados ratified the United Nations Framework Convention on Climate Change (UNFCCC) in March 1994 and Kyoto Protocol in August 2007. Barbados submitted its initial national communication under the UNFCCC in October 2001.

As a low-lying developing Small Island Sate, the Government of Barbados recognizes the importance of preparing for the impacts associated with the Climate Change phenomenon, such as sea-level rise (and its associated phenomena such as coastal erosion, inundation, and saline intrusion of fresh water aquifers) and increased variability in climate (inclusive of rainfall and storm frequency). In particular, coastal zone management is crucial for Barbados in surviving climate change impacts and Barbados has established the Coastal Zone Management Unit, which implements Integrated Coastal Zone Management through Coastal Zone Management Act and the Marine Pollution Control Act.

At the same time, Government of Barbados has taken an initiative to overhaul its energy sector to increase the use of indigenous renewable energy sources and employ energy conservation techniques to enable Barbados to become less dependent on imported fuel as well as to achieve sustainable development.

- **National efforts/measures against climate change**

The primary goal of Barbados' climate change policy is to establish a national process for adapting to climate change effects and minimising greenhouse gas emissions over the short, medium and long term, in a manner that is co-ordinated and consistent with the broader sustainable development aspiration.

The policy is designed to establish an appropriate mechanism for responding to the challenges of climate change, and engaging in regional and international climate change negotiations, planning and response mechanisms. It is also expected to bring about full stakeholder engagement in the development and execution of domestic climate change mitigation and adaptation actions, and conduct research.

At the national level, the policy outlines plans to continue institutional, administrative and legislative improvements to effect climate change mitigation and adaptation, as the country pursues its green economy status. It also involves Barbados moving away from its reliance on fossil fuels as the sole energy source, and improving energy efficiency across all sectors. The policy also speaks to the country's ability to improve its national capacity for disaster risk and response management.

In addition, the Government of Barbados (GOB) has set as one of its objectives the increased use of renewable energy. The aim is to reduce the emissions of greenhouse gases from the combustion of fossil fuels. Currently there is a study on the potential use of photovoltaic technology to produce electricity. It is expected that as this technology becomes less expensive that it would be utilized further and would be able to make a significant contribution to the energy grid of the country. Initial investigation has also been conducted into the feasibility of utilizing wind energy in Barbados to produce electricity. It is expected that by the year 2010, a wind farm capable of supplying 10 percent of the total energy needs of the country would have been established.

Ministry of Family, Youth, Sports and Environment of Barbados is the designated national authority for CDM. Barbados is involved in one of multiple countries Programmatic CDM projects under validation. The project aims to replace existing and predominant use of kerosene-based lighting with purpose designed LED/CFL lamps in the household.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

In its initial national communications, Barbados has calculated anthropogenic GHG emissions and removals by sink for the years 1990, 1994 and 1997. Analysis of the national GHG inventory for the years 1990, 1994 and 1997, produced the following main points:

- CO_2 emissions make up 94% of total GHG emissions in 1990, 96% in 1994 and 96% in 1997. A comparison of the three years investigated shows a progressive increase in total CO_2 emissions from 1990 to 1997. CO_2 emissions in the years 1990, 1994 and 1997 were calculated at 1,564.23 Gg, 1,913.81 Gg and 2,198.40 Gg respectively.

- The greatest source and the highest growth of CO2 emissions is from the combustion of fuel used for the generation of electricity, an average of 74% for the three years investigated. This is followed by CO_2 emissions from combustion of fuel for road transportation, which on

average accounts for 14% of emissions of this GHG. This is due to heavy dependence in Barbados on the imported fossil fuel for energy and transportation requirements. CO_2 emissions from fuel combustion in the manufacturing/industrial, commercial/institutional, residential and agricultural sectors in Barbados are relatively small, together making up an average of 9% of total CO_2 emissions.

- Consideration of total emissions of non- CO_2 GHGs reveals that the gas of greatest concern is methane (CH_4). Methane emissions show a progressive increase from 1990 (78.66 Gg) to 1994 (85.07 Gg) to 1997 (86.36 Gg), however, the percentage of total emissions remained constant for the three years at 4%.

- Emissions of the other non- CO_2 GHGs, carbon monoxide (CO), non-methane volatile organic compounds (NMVOCs), sulphur dioxide (SO2), oxides of nitrogen (NOx) and hydrofluorcarbons (HFCs) are considerably lower than emissions of CH_4 for all of the years, together accounting for an average of 0.55% of total emissions.

- Land Use changes and forestry, which is characterised by the regrowth of natural biomass on abandoned agricultural lands, removed some 11 Gg of CO_2 annually for all years investigated.

Table 1: CO2 Emissions by Sector (Gg)

Sector	**1990**	**1994**	**1997**
Energy Industries	1032.20	1402.69	1627.51
Manufacturing Industries and Construction	95.50	41.79	39.88
Road Transport	225.12	257.44	251.66
Commercial/Institutional	13.42	150.99	53.43
Residential	15.95	13.47	53.18
Agriculture	5.03	2.00	1.66
Other	0.00	0.00	0.00
Total	1564.23	1913.81	2198.4

Table 2: CH4 Emissions by Source (Gg)

Sector	**1990**	**1994**	**1997**
Fuel Combustion	0.05	0.00	0.00
Industrial Processes	0.00	0.00	0.00
Agriculture	1.13	1.13	1.13
Land Use Change and Forestry	0.00	0.00	0.00
Waste	77.48	83.94	83.94
Total	**78.66**	**85.07**	**86.36**

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Barbados has not submitted its NAMA plan.

- **Mitigation Options**

Barbados' GHG mitigations options are focused on the following areas.

• CO2 emissions from fuel combustion for electricity generation.
- Efficient use of energy and promotion of renewable alternatives.
- Options considered include wind power, recovery of landfill gas, use of liquefied natural gas imported from Trinidad, cogeneration using bagasse and solar energy generation.
- Energy efficiency measures in the industrial, commercial and residential sectors
- Reduction of CO2 emissions from the cement industry
-

• CO2 emissions from road transportation.
- Introduction of electric vehicles and hybrids

• CH4 emissions from waste management activities.
- Reducing the disposal of organic materials in landfills
- Recovery of methane gas from the mangrove pond landfill
-

• CH4 emissions from agricultural activities.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

Barbados' vulnerability to climate change has been analyzed in its initial national communications in the following manner.

Sea Level Rise and Coastal Zone Issues

One of the most serious challenges facing Barbados as a result of global warming and a changing climate is sea level rise and the consequences of increased coastal erosion and inundation and salt-water intrusion into coastal aquifers. Eroding coastlines will place critical infrastructure in Barbados at risk to flooding. This will have serious implications for the tourism industry and other sectors in Barbados. The Intergovernmental Panel On Climate Change (IPCC) in the third assessment report also suggest that the intensity of the most severe hurricanes is likely to be greater, thus compounding the possible effects sea level rise.

Water Resources

Fresh water resources are likely to be threatened in two main ways by climate change. Firstly, by sea level rise, which is likely to increase salt-water intrusion within freshwater aquifers. Secondly, by increased frequency and severity of droughts, as has been experienced in recent decades; and many climate models suggest this may intensify in the future in the Caribbean region. Barbados is almost entirely dependant on groundwater supplies.

Climate Related Disasters

With increases in intensity of rainfall, increases in flood events are likely to occur. This will result in increases in the amount of financial resources that will have to be allocated to flood prevention activities. It is clear that there will be a need to strengthen meteorological warning capabilities, and it may be necessary to relocate and remove buildings, which may be in flood prone areas. There will be the need to strengthen and improve general preparedness and response measures in future years given the likelihood that there be increase flooding from intense rainfall events.

Agriculture

The IPCC third assessment report notes that for the Caribbean, there are indications that by the years 2050 and 2080, annual mean temperatures could increase by 2.03 ºC, and 3.06 ºC respectively. Conversely, annual mean precipitation could decrease by 5.2% by 2050 and 6.8% by 2080. These predictions, if they materialize, are likely to have a very negative impact on both global and local agriculture, such that, apart from the sugar sector suffering, Barbados' food security may very well be under severe threat. Unless preventative measures are taken, and in the very near future, a temperature increase of 2ºC-3ºC over the next 50-80 years could see several local plant and animal species gradually vanishing from the Barbadian landscape.

Coral Reefs and Fisheries

As with most island states the coral reefs in Barbados represent one of the islands most important resources. While rising sea level may not affect coral reefs, increased temperature due to climate change could cause an increase in coral bleaching events. Thus climate change will have significant negative impacts on the coral reefs in Barbados if increased temperatures cause frequent bleaching events. Damage to coral reefs will affect fisheries, tourism and ultimately the livelihood of the country.

The fisheries industry is extremely important in Barbados. The bleaching of coral reefs will obviously have a negative affect on fisheries stocks, as the coral reefs are a nursery for many fish species. Further research is needed in order to understand the change, which could occur with regards to fish species under a changing climate.

- **Summary of National Adaptation Programme of Action (NAPA)**

Barbados has not submitted its NAPA, however, "Review of current and planned adaptation action; the Caribbean" describes proposed response to expected impact of climate change as follows.

Table 3: Climate change vulnerabilities and proposed responses in Barbados' National Communication

Priority Sector	Vulnerabilities	Proposed Responses
Agriculture	· Less rain and more drought causing low crop yields, reduction in genetic diversity, reduced feed for livestock, and an increase in the numbers and generation of pest	· Development of a food security strategy · Research into more drought resistant crops and crops with shorter growing seasons · Inventory and monitoring of resources

		· Wider application of Integrated Pest Management · Integrated water resource management
Coral reefs and fisheries	· Less rain may cause reduced influx of nutrients into the near-shore · Increased flooding may increase near-shore salinity and sediment load ·Increased temperature may cause heat-induced mortality of fish · Sea level rise	· Engage in coastal zone management · Conduct monitoring and research activities · Enhance the resilience of natural systems through improved pollution control · Implementation of comprehensive watershed management systems · Implementation of setbacks and zones for coastal buildings; establish a building code for coastal buildings · Beach nourishment · Construction of groynes, revetments and breakwaters
Freshwater resources	· Less rain and more drought may reduce water availability and encourage saline intrusion along the coast · Increases in temperature may cause increased evapotranspiration · Sea level rise	· Integrated water resource management · Control leakage from water mains · Desalinization and other augmentation techniques
Human settlement/ infrastructure	· Less rain and more drought may increase demand for water, have an adverse effect on food supply, and cause structural damage · Increased flooding may impact insurance costs	· Relocation and redesign of wells · Integrated water resource management · Public awareness campaigns ·Incorporation of climate change considerations into building codes and coastal

- **Adaptation Options**

Given the vulnerability of Barbados to climate change, adaptation and the implementation of adaptations policies and options are extremely urgent given the little progress, which is being made with regards to reducing greenhouse gas emissions.

Coastal Zone Adaptation Measures and Options

Coastal adaptations options mainly include the implementation of set backs and zones for coastal buildings, a building code for coastal buildings, beach nourishment in order to enhance resilience of a particular beach, or the construction of groynes, revetments and breakwaters.

Water Adaptation Measures and Options

The adaptive strategies outlined here will deal with the increased salinization of the aquifers and the potential reduction in available water resources.

Policy Options

The WHO drinking water standard for chlorides is 250 ppm. This is regarded as an aesthetic

value related to taste but it does have minor health implications. Since these are only guideline values, government could set standards to reflect higher values, provided there are no serious health effects. This would significantly reduce the risk of these wells exceeding the new guideline values for chlorides. In Barbados this should be taken with caution as a rise in chlorides goes together with a rise in sodium. Given the high incidence of hypertension in Barbados this option might put the population at risk.

Improved Water Resources Assessment

One major gap usually identified in monitoring the effects of climate change and in particular water resources trends is the lack of data. To detect any changes in water resources either due to usage or climate change, there must be a sustained effort to capture good quality data, with well trained staff to analyse the data. Such data gives national authorities the ability to see how the aquifer is performing under current and past stresses.

Demand Management and Leakage Control

If demand is reduced the abstraction from the aquifers is reduced, as are the probability of the negative effects of saline intrusion. Demand management, the key to this problem, is a multifaceted exercise. It entails public education, pricing policy, metering, water conserving devices and leak detection.

Public Education

Sustainable water use, with or without sea level rise, means convincing the public that fresh water resources are scarce and valuable resources and need to be protected. Public education is the key in re-directing cultural attitudes to water use and to direct them to purchase and use low water use fixtures.

Metering and Pricing Policy

Effective metering of consumers is the only way a water utility can accurately verify usage by its customers. Such data provided by the meters is essential in planning water demand reduction strategies. Once a substantial proportion of the customer base has been metered, a "rising-block tariff" can be imposed. This system targets the high water usage, while allowing customers the average amount of water necessary for daily use at a reasonable rate. Presently over 85% of the customer base in Barbados is metered. The next step should be the introduction of the tariff.

Water Conservation and Water Conservation Devices

Since 1997 the Government of Barbados has made it a planning requirement that all houses with over 1500 square feet floor space, must have a system of collecting rain water to supplement its non-potable water use requirement, for things such as the wetting of gardens. Such a policy reduces the stress on the aquifer by eliminating these water-demanding operations from the extraction demands. Furthermore such policies increase the awareness of the customer as to practical ways that the customer can be involved in water conservation.

Leakage detection and Control

Piped water supply systems often have substantial leaks and active leak detection and repairs are

a required and ongoing part of water supply system management. The Water Resources Management and Water Loss Studies (1997, Task 6) reported unaccounted for water (UFW) at an average of 60%. A targeted leak detection and repair programme aiming to reduce this figure to 40% would significantly reduce the stress on the aquifer or make approximately 3 MGD available to the system. It should however be noted that UFW may not be synonymous with leakage as it includes items such as services missed by the authority and underestimated water usages. The Barbados Water Authority estimates leakage between 25% and 40%. It is usually more cost effective and environmentally prudent to control leakage than to develop an alternative source.

Physical Options

The sea level rise being predicted in the climate change scenarios are relatively slow and long term. If one considers sea level rise, not taking any other climate change factors into account, the expected increase in sea level will have a concomitant rise in the water table. Under such a scenario the option would be to adjust the level of pumps, to maintain the same distance between the saltwater interface and the bottom of the pump.

At present the BWA uses the strategy of reducing production or a complete shut down of wells in breach of the WHO chloride standard. Such a policy would continue to be helpful once alternative water resources could be found to supplement those taken out of supply.

Technological Options

There are also technological solutions to the water resource problems likely to be generated by sea level rise. Two viable options to help with the situation on the west coast are Wastewater Reuse and Desalination.

Agricultural Adaptation Measures and Options

The majority of adaptation options with regards to agriculture will focus on doing the suitable research on climatic conditions in the future and the selection of appropriate varieties of crops for cultivation in the changing climatic conditions. There may be a need to change from the traditional crops to new ones, or perhaps there will be a need for the cultivation of drought resistant varieties.

Capacity building in the area of agricultural research as it pertains to climate change, is an urgent requirement in Barbados. There is a need for the funding so that effective research can be carried out.

5. Key industries and economic activities

Historically, the Barbadian economy was dependent on sugarcane cultivation and related activities. However, in recent years the economy has diversified into light industry and tourism with about four-fifths of GDP and of exports being attributed to services. These foreign exchange-earning industries are especially important as Barbados imports nearly all of its food stuffs, fuels, construction materials and other goods. Growth has rebounded since 2003, bolstered by increases in construction projects and tourism revenues, reflecting its success in the higher-end

segment, but the sector faced declining revenues in 2009 with the global economic downturn. The country enjoys one of the highest per capita incomes in the region. Offshore finance and information services are important foreign exchange earners and thrive from having the same time zone as eastern US financial centres and a relatively highly educated workforce. The government continues its efforts to reduce unemployment, to encourage direct foreign investment, and to privatize remaining state-owned enterprises. The public debt-to-GDP ratio rose to over 100% in 2009-11, largely because a sharp slowdown in tourism and financial services led to a wide budget deficit.

In terms of vulnerability of its economy to climate change, sugar and tourism sectors stand out as the most vulnerable. Sugar contributes about 2% of GDP, while tourism contributes about 15%.

6. National development strategy

"The National Strategic Plan of Barbados 2005–2025: Global Excellence, Barbadian Traditions" provides the blueprint for the realisation of Barbados' vision of becoming a fully developed society that is prosperous, socially just and globally competitive by the end of the first quarter of this century.

The Plan is based on six strategic goals in pursuit of the national vision for 2025.

"Inspired, exulting, free": Unleashing the Spirit of the Nation.
GOAL ONE speaks to a cultural transformation that will reinforce Barbadian values and national identity and act as a catalyst for propelling Barbados into the 21st century as a fully developed society. This goal will seek to create greater equity and social justice, while building an inclusive society with opportunities for all.

"Firm craftsmen of our fate": New Governance for New Times.
GOAL TWO envisions vastly improved governance. It foresees a Barbados with, a "fully Barbadianised" constitution free of all vestiges of colonialism; a modernised parliamentary and electoral system; greatly enhanced political participation and the empowerment of all communities. It also envisions a radical overhaul of the administrative machinery of government as a catalyst for change, while also strengthening civil society as a critical part of the governance for the 21st century. It further envisages that there will be higher levels of self- reliance, less dependency on the state and greater diversity and tolerance.

"Strength and unity": Building Social Capital.
GOAL THREE places people at the heart of the development process. It promotes the building of social capital. This involves the development of the human resources necessary to function in a knowledge-based services economy and the creation of appropriate family and community values. This calls for a revolution in education which will unlock the productive potential of all Barbadians. A good quality of life will also be paramount and, therefore, a well-developed public health system and the eradication of poverty from our social landscape will all be part of this social transformation.

"These fields and hills": Strengthening the Physical Infrastructure and Preserving the Environment.

GOAL FOUR requires the protection, preservation and enhancement of our physical infrastructure, environment and scarce resources as we seek to advance our social and economic development. It demands that we find the right balance between our development and the preservation of our physical surroundings. It calls for access to adequate water and energy supplies, a good transportation system and the development and maintenance of sound infrastructure.

"Upward and onward": Enhancing Barbados' Prosperity and Competitiveness.

GOAL FIVE seeks to enhance Barbados' prosperity and competitiveness in the world economy. This will require rapid and radical transformation in the way we carry out our productive activities. We must identify those areas of economic activity that are viable and competitive, and that can contribute to sustainable growth, employment and overall prosperity for everyone. Focusing on the export of services such as tourism and international business, while exploiting new ones such as culture and health, will all contribute to a more diversified and prosperous economy.

"Strict guardians of our heritage": Branding Barbados Globally.

GOAL SIX calls for us to continue consolidating our image in the world. This image has served us well and has brought us considerable international respect since independence. Our political stability, education, democratic governance and good leadership have all earned for Barbados worldwide recognition. Our duty will be to continue to show others how a small country can be successful and yet retain its identity; in other words, we have to brand Barbados globally.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.18. 東ティモール

Timor Leste

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Following its independence in 2002, Timor-Leste continues to be faced with enormous development challenges. Climate change represents an additional risk with the potential to cause further set-backs by undermining progress made on key development indicators, in particular food security. The main concerns raised related to changes in rainfall and temperature patterns and their effects on drought, flooding and landslides. The agricultural and water sectors were the two felt to be most heavily affected by climate change.

Adaptation measures will be focused on reducing the adverse effects of climate change and promote sustainable development. Such measures will be in the areas of food security, water resources, human health, natural disasters, forests, biodiversity and coastal ecosystems, livestock production, physical infrastructure and capacity building.

2. Summary on climate change related issues in the country

- **Climate change policy**

Timor-Leste ratified the United Nations Framework Convention on Climate Change (UNFCCC) in October 2006, the Kyoto Protocol to the UNFCCC in October 2008.

The Constitution of Timor Leste stipulates that healthy and ecologically-balanced environment is a constitutional right and that the State, while recognising the need to "preserve and rationalise natural resources" should promote actions aimed at "protecting the environment and safeguarding sustainable development." As such, climate change and environmental sustainability issues are becoming an integral part of national planning policies. The Secretariat of State for Environment (SEMA) has drafted the Basic Law on Environment, which has been submitted for approval by the Council of Ministers, which includes reference to the government's responsibility in climate change mitigation and adaptation. SEMA is also currently developing a short, medium and long-term environmental strategic plan to better address environmental services as stated in the National Constitution. After approval by the Council of Ministers, this plan will provide guidance in annual operational planning for 10 years, with short, medium and long-term goals.

- **National efforts / measures against climate change**

Timor-Leste has started its Initial National Communication to the UNFCCC with the support of the Global Environment Facility, the Australian Agency for International Development (AusAID) and the United Nations Development Programme (UNDP), but has not yet submitted its national communications.

Secretariat of State for Environment in Ministry of Economy and Development is the designated national authority of Timor-Leste. Timor-Leste currently does not have any CDM project

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

Timor-Leste has not provided its Greenhouse Gas Inventory Data.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Timor-Leste has not submitted its NAMA.

- **Mitigation Options**

Timor Leste remains heavily forested, however unsustainable agricultural practices such as 'slash and burn' agriculture, as well as destruction of forests, has seen forest cover in Timor Leste decline from 65% in 1990 to 54% in 2004, with annual deforestation estimated at 1.2%.

The protection and the sustainable management of forest and land resources, such as Reducing Emissions from Deforestation and Degradation (REDD) and Sustainable Land Management (SLM), can reduce the impacts of climate change and is an important mitigation option, increase the ability of communities to adapt to climate change, and support rural livelihood activities thus aiding poverty alleviation efforts.

Also, there is a GEF project underway to promote the development and utilization of renewable bio-energy instead of the wood fuel which can contribute to prevention of deforestation, diversification of fuel as well as mitigation of GHG emissions.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

Reviews of studies and analysis of climate change models suggest that the impacts of climate change on Timor-Leste are likely to include changes that are summarized below.

Parameters	Changes
Temperature	Overall increase without significant variability across the seasons. Extreme temperature events are expected to increase in intensity and length.
Rainfall	Expected increase in mean rainfall values. Dry season expected to become drier. Extreme rainfall events expected to increase in intensity and decline in frequency.

Sea level rise	Increase in line with global projections is expected.
Tropical cyclones	Expected to decrease in frequency and length of event, but expected to be more intense in their nature.
Ocean	Expected to become more

The following sectors were identified to be vulnerable to climate change.

The Agroforestry, Agriculture and Livestock Sector

NAPA stakeholders consistently identified a wide range of concerns for the agroforestry, agriculture and livestock sector as a result of climate change. There was recognition of the importance of reliable water resources and the potential increased stress that climate change posed for these. Stakeholders also voiced a concern at the potential far-reaching impacts of climate induced natural disasters on agricultural productivity and livelihoods. Participants at both local and national level also expressed concerns over the increased challenges to the sustainability of current farming systems and methods.

The Water Sector

Water supply, and in particular lack of water in the dry season, is the most important environmental constraint on agricultural production. Communities face dwindling access to water during the dry season when the largely natural springs that they rely on may reduce considerably in flow or cease altogether. Groundwater resources, which exist in abundance in some areas, remain largely unexploited. Climate change could result in an increased amount of rain received throughout the year. However, the wet season may be slightly drier and the dry season may be slightly wetter. Rainfall may come in the form of fewer but more intense events. El Nino events which result in delayed rain and less rain may become more severe.

The Biodiversity (forests, freshwater aquatic, marine and invasive alien species) Sector

Particular concerns were expressed in relation to the coastal zone, with a combination of more frequent and intense storms and a potential rapid rise in sea level being identified as having the most adverse effects.

The Health Sector

The main areas of concern for the health sector are related to the impact of increased variability in rainfall patterns and intensity, as well as increases in air temperature. In particular, concern was raised over the interaction between increases in temperature and increases in the incidence of flooding leading to knock-on effects for disease vectors and their breeding grounds.

The Infrastructure Sector

Timor-Leste's infrastructure is still at an early stage of development. However, taking into account the potential for changes in terms of increased air temperature, in rainfall patterns and intensity, and in frequency and strength of storm activity, stakeholders expressed concern that climate change poses further obstacles to the development of the nation's infrastructure.

Disasters – Cross-cutting

In terms of the interaction of climate change and natural disasters, there was some concern that disasters already being witnessed in Timor-Leste had the potential to become more frequent and widespread thereby bringing about further destruction of property, livelihoods and injury to persons than is currently witnessed.

- **Summary of National Adaptation Programme of Action (NAPA)**

NAPA Vision

The Timor-Leste NAPA supports the goals of the strategic plan by seeking to ensure that the needs of those most vulnerable to climate change are fully reflected in the development goals and aspirations of the country. The Timor-Leste NAPA recognizes and addresses the fact that climate change will have wide-ranging impacts within and across multiple sectors and that the knowledge and capacity to respond is lacking. The Millennium Development Goal Report for 2010 prepared by the Government of Timor-Leste therefore sets out the vision of the NAPA as being to make the Timorese population resilient to climate change.

Objectives of the NAPA

The objectives of the Timor-Leste NAPA are:

- To develop and implement immediate and urgent project based activities to adapt to climate change and climate variability,
- To increase awareness of climate change impacts and adaptation activities in communities, civil society and government, and
- To provide a road-map for the State Secretariat for Environment to follow in working across all climate change vulnerable sectors to assist the integration of adaptation concerns into policies, strategies, programmes and activities.

- **Adaptation Options**

The priority adaptation options are shown below

Rank	Adaptation Options	Activities
1.	**Food Security:** Reduce vulnerability of farmers and pastoralists to increased drought and flood events by improving their capacity to plan for and respond to future climatic conditions and improve national food production.	• Develop integrated agroforestry and watershed management including climate change dimensions. • Based on existing national action plans on sustainable land management, implement integrated, sustainable land management promoting fixed/permanent agriculture, reduced burning, reduced erosion, and increased soil fertility. • Reforestation of degraded land to prevent landslides and provide a sustainable fuel wood source in priority areas with high vulnerability to

		climate-related risks. - Improve physical infrastructure/civil engineering and natural vegetation methods to prevent landslides in hill sites, roads and river banks. - Education and awareness and conduct a pilot demonstration on sustainable agriculture and forest management that increases resilience and reduces climate-related impacts of shifting cultivation and unsustainable upland farming practices.
2.	**Water Resources**: Promote Integrated Water Resource Management (IWRM) to guarantee water access for food production, sanitary uses, ecosystems and industry development.	- Build climate proofed and environmentally sustainable infrastructure to protect water sources (springs, streams, wells, etc.) in order to provide safe water supplies during climate change extreme event periods. - Enhance government and community strategies to respond to drought exacerbated by climate change. - Create and enhance water harvesting model (capture and storage), water distribution system and management system at all levels to avoid water shortages due to climate change. - Control of quantity of water use by industry, and water pollution control standardization including coffee processing waste management in a climate change context.
3.	**Human Health:** Enhance capacity of the health sector to anticipate and respond to changes in distribution of endemic and epidemic climate-sensitive diseases, and reduce vulnerability of the population to infection in areas at risk from expansion of climate-related diseases.	- Strengthen SISCA (Integrated Community Health Services) especially on health issues related to climate change related diseases. - Strengthen integrated early warning system (EWS) at community level in relation to airborne and vector borne diseases and epidemics with disease surveillance. - Review existing guidance and standard issues by Minister of Health on respiratory, airborne and vector diseases to take climate change into consideration.
4.	**Natural Disasters:** Improve institutional and staff capacity in the disaster sector in relation to climate change induced disasters.	- Establish early warning systems in areas identified as vulnerable to disasters such as floods and storms. - Integrate of climate risk information into traditional disaster risk reduction and management.

5.	**Forests, Biodiversity and Coastal Ecosystems Resilience:**	▪ Maintain mangrove plantations and promote awareness raising to protect coastal ecosystems from impacts of sea level rise. ▪ Include ecosystem management in national planning to develop sustainable, ongoing programme, nurseries and community awareness development - 1st year assessment, 2nd year plan, 3rd year implementation and maintenance.
6.	**Livestock Production:**	▪ Improve planning and legal framework for promoting sustainable and balanced food for livestock production under increased climate variability and climate change conditions.
7.	**Physical Infrastructure:** Improve regulations and standards for climate-resilient infrastructure.	▪ Review existing laws, regulations and standards to enhance CC-resilience of critical infrastructure. ▪ Pass new legislation to strengthen and guarantee national development through improved regulation of the quality of materials, adapted building codes and practices and law enforcement.
8.	**Oil and Gas Production:** Strengthen and protect valuable offshore oil and gas infrastructure against climate change impacts.	▪ Protect offshore infrastructure against strong wave damage that impacts the distribution of gas and oil, and reduce accidents and destruction of offshore oil and gas infrastructure; including: i) early warning system equipment; ii) data information to show occurrences; iii) equipment protection.
9	**National Institutional Capacity Development for Climate Change:**	▪ Strengthen the mandate of the cross-sectoral national climate change team to improve coordination and engagement. ▪ Establish a Climate Change Unit with necessary staffing and budget to engage in and support national policy development and programming activities. ▪ Capacity development support for key non-governmental institutions in low emissions and climate resilient development planning, including national NGOs and research/educational institutions. ▪ Develop a national climate change strategy and action plan. ▪ Promote sub-national capacity development for improved adaptation planning and

		implementation. ▪ Strengthen national hydro-meteorological department to collect, compile, analyze and disseminate climate-related data.

5. Key industries and economic activities

In late 1999, about 70% of the economic infrastructure of Timor-Leste was laid waste by Indonesian troops and anti-independence militias. Over the next three years a massive international program led to substantial reconstruction in both urban and rural areas. The country continues to face great challenges in rebuilding its infrastructure, strengthening the civil administration, and generating jobs for young people entering the work force, after its independence in May 2002.

The development of oil and gas resources in offshore waters has greatly supplemented government revenues, but has done little to create jobs for the unemployed in part because there are no production facilities in Timor-Leste. Gas is piped to Australia. In June 2005, the National Parliament unanimously approved the creation of a Petroleum Fund to serve as a repository for all petroleum revenues and to preserve the value of Timor-Leste's petroleum wealth for future generations. The Fund held assets of US$9.3 billion as of December 2011.

The economy continues to recover strongly from the mid-2006 outbreak of violence and civil unrest, which disrupted both private and public sector economic activity. All of the estimated 100,000 internally displaced persons returned home by early 2009. Government spending increased markedly from 2009 through 2011, primarily on basic infrastructure, including electricity and roads. Limited experience in procurement and infrastructure building has hampered these projects. The underlying economic policy challenge the country faces remains how best to use oil-and-gas wealth to lift the non-oil economy onto a higher growth path and to reduce poverty. The parliament in late 2011 approved an ambitious, infrastructure-focused $1.67 billion budget for 2012 that would allow the government to borrow for the first time in its 10-year history.

6. National development strategy

Timor-Leste's Strategic Development Plan (2011-2030) sets out that the next decade will focus on providing the basic conditions for development in all areas and infrastructure is one of the areas that is highlighted. The Indonesian withdrawal in 1999 resulted in extensive destruction of Timor-Leste's infrastructure. Since this time, addressing the huge infrastructural constraints has been on the government agenda but given the extent of destruction, along with the particular geographical circumstances in the country, this has been expensive. Such difficulties include the mountainous terrain and the construction of roads along the sea where they are more exposed to the elements and erosion. Future plans foresee significant investment in infrastructure – roads, ports, airports, communications and electricity. At the same time oil and gas has become an

important sector for Timor-Leste and is seen as the platform from which major economic development can be achieved in the coming years. This infrastructure is mainly located at sea and it too is vulnerable to the elements.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.19. フィジー

Fiji

1. Mainstreaming adaptation / mitigation actions in the national development strategy

In spite of Fiji being a minor emitter on a global scale, it is of significant importance that it continues to take measures in mitigation of greenhouse-gas emissions. Apart from this being part of its obligation to the UNFCCC, mitigation measures will enable the country to participate in technology-transfer opportunities, especially when it is reasonable to assume that emissions will continue to increase in the future. The energy sector is the major source of GHG emissions in Fiji, with emissions dominated by the transport and energy industries. Therefore, to have a significant reduction in the national emissions of GHG gases, mitigation measures will need to target the release of carbon dioxide from this sector.

Fiji's sustainable development policies are categorized under six broad areas, namely:

- Macro Economic Stability;
- Natural Resource Utilization;
- Physical Infrastructure;
- Social Development and Affirmative Action;
- Protection of the Environment; and
- External Relations.

2. Summary on climate change related issues in the country

- **Climate change policy**

Fiji ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 25 February 1993 and the Kyoto Protocol on 17 September 1998, and submitted their first National Communications Report on 18 May 2006.

Overexploitation of resources and unsustainable management practices will affect the socio-economic fabric of Fiji as well as reducing the resilience of the environment and increasing its vulnerability to the adverse effects of climate change. Therefore the Fiji government has developed and will be developing various sustainable management policies with the realisation that such polices will be the most beneficial response strategy to help cope with climate change and other environmental and socio-economic problems.

This strategy is in line with the Principles contained in Article 3 of the UNFCCC which refers to the development of policies and measures related to sustainable development, by parties, to protect the climate system against human-induced change, and these should be integrated with national development programme.

The Ministry of Foreign Affairs and International Cooperation is the designated national authority

of Fiji. Fiji has two hydropower projects and one sewage treatment project submitted to UNFCCC of which two projects had been registered as CDM. One of the hydropower projects has issued 35,550 CERs. Fiji also is included in one of the multiple countries Programmatic CDM project under validation. The project aims to replace existing and predominant use of kerosene-based lighting with purpose designed LED/CFL lamps in the household.

- **National efforts / measures against climate change**

Fiji has been enabled to meet its national obligations under the UNFCCC through support received through the Pacific Islands Climate Change Assistance Programme (PICCAP). PICCAP is a three-year programme funded by the Global Environment Facility (GEF), executed by the United Nations Development Program (UNDP) and implemented through the South Pacific Regional Environment Programme (SPREP), in close collaboration with the UNITAR-administered CC: TRAIN.

The implementation of PICCAP in Fiji commenced with the formation of the National Climate Change Committee (NCCC) in 1998. The NCCC was established to advise the government on matters relating to climate change during the UNFCCC process, and draws on expertise within key government departments. The committee facilitates the work of a technical team comprising a National PICCAP Project Coordinator and technical staff drawn from relevant sectors to participate in the CC:TRAIN training programme. The project coordinator is based with the Fiji Department of Environment.

Fiji has made good progress since the UNCED. Since 1992 Fiji has signed and ratified 19 International and Regional Conventions that emanated from the Earth Summit; and formulated 17 international and regional plans of actions, 25 national policies and plans and 17 national implementation programmes addressing sustainable development.

Fiji has ratified the Convention on Biological Diversity and the Framework Convention on Climate Change. Under the Convention on Biodiversity, a Biodiversity Strategy and Action Plan was produced in 1999, recommending resource-management projects to address depleting resources, land degradation and the unsustainable use of resources.

Fiji has drafted a Sustainable Development Bill to provide a framework for the sustainable management of the environment. It is a comprehensive and integrated piece of legislation that focuses on Environmental Impact Assessments, Codes of Environmental Practice, Natural Resource Management and the establishment of a National Council for Sustainable Development to provide effective and coordinated decision making on sustainable development planning, policies and implementation of programmes. An extensive consultative process has been mounted to ensure that the Sustainable Development Bill is acceptable to all.

Fiji's sustainable-development policies are entrenched in Government's "Strategic Plan for the New Century (SP): Policies and Strategies for the Sustainable Development of Fiji" 1999, and in the "Strategic Development Plan 2002-2004 Rebuilding Confidence, Stability and Growth". The policies are consistent with the Millennium Development Goals adopted in September 2000. The

two plans emphasize that sustainable development is achieved through policies that are economically sound, socially balanced and environmentally friendly.

The sustainable policies are categorized under six broad areas, namely:

- Macro Economic Stability;
- Natural Resource Utilization;
- Physical Infrastructure;
- Social Development & Affirmative Action;
- Protection of the Environment; and
- External Relations.

Two categories that directly address the impacts of climate change are natural resource utilization and the protection of the environment.

3. Sustainable Development and Mitigation

● National inventory of greenhouse gas

For the purposes of reporting and future monitoring and as is required by the UNFCCC guidelines 1994 was used as the base year for the Greenhouse Gas Inventory for their national communication to the COP. Based on the six major greenhouse gases covered in the Kyoto Protocol, namely carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride, the main sources of major greenhouse gases in Fiji were found to be:

- Carbon dioxide from burning of fossil fuel and biomass
- Methane – emission from animal and human wastes and flooded rice fields
- Nitrous oxide from burning of biomass and incomplete combustion of fossil fuels

Table 1: GHG Emissions by Sector (Gg)

		CO_2	CO_2	CH_4	N_2O	NO_X	CO	NMVOC	SO_2
	Total National Emissions and Removals (Gg)	Emission	Removal						
			7019	31.7	0.13	4.8	110	5.5	0.03
1	Energy								
	A. Fuel Combustion Activities	776							
	1. Energy Industries	36	Nil	NE	NE	NE	NE	NE	NE
	2. Manufacturing and Construction	125	Nil	NE	NE	NE	NE	NE	NE
	3. Transport	528	Nil	NE	NE	NE	NE	NE	NE
	4. Other Sectors	87	Nil	NE	NE	NE	NE	NE	NE
	5 Other	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
2	Industrial Processes	45	Nil	Nil	Nil	Nil	Nil	5.5	0.03

3	Solvent and Other Product Use	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
4	Agriculture	Nil	Nil	22	0.09	3.3	58	Nil	Nil
5	Land-Use Change and Forestry	Nil	7019	6	0.04	1.5	52	Nil	Nil
6	Waste	Nil	Nil	3.7	Nil	Nil	Nil	Nil	Nil
7	Other	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	[NE: Not Estimated]								

Use the IPCC notations provided in the Revised 1996 IPCC guidelines.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Fiji has not submitted its NAMA plan. However, as presented in the "Mitigation/Adaptation Options" sections below, the National Communication of the country raises several mitigation measures.

- **Mitigation Options**

In spite of Fiji being a minor emitter on a global scale, it is of significant importance that it continues to take measures in mitigation of greenhouse-gas emissions. Apart from this being part of its obligation to the UNFCCC, mitigation measures will enable the country to participate in technology-transfer opportunities, especially when it is reasonable to assume that emissions will continue to increase in the future.

The energy sector is the major source of GHG emissions in Fiji, with emissions dominated by the transport and energy industries. Therefore, to have a significant reduction in the national emissions of GHG gases, mitigation measures will need to target the release of carbon dioxide from this sector.

There are three basic policy options available for the mitigation of greenhouse gases:

- Demand-side options: reduce energy consumption while maintaining the level of service desired by the user;
- Supply-side options: increase energy-conversion efficiencies, or replace fossil fuels with renewable energy; and
- Development of sinks, such as afforestation and sustainable forest management, to remove greenhouse gases from the atmosphere.

In Fiji, the various government departments (Energy, Environment and Forestry) have collaborated closely with the other regional organisations and the private sector, in setting policies that encompass the above policy options available for the mitigation of greenhouse gases.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

Over 90% of the population, both rural and urban, can be considered coastal dwellers, where the vast majority of services, infrastructure, agricultural production and social centres are located.

Coastal Resources

Climate change is likely to affect the coastal resources of Fiji in a variety of ways.

- Sea-level rise (SLR) may lead to increases in coastal erosion and coastal inundation, increased exposure of beaches to wave action (as coral growth lags behind sea-level rise), and in some cases the retreat of mangroves.
- Increased sea surface temperatures may lead to an increase in coral bleaching. This, together with the lag in coral growth, may lead to a reduction in reefal sediment production necessary for maintaining shoreline stability. Coral bleaching is also likely to have adverse effects on coastal biological diversity and fisheries.
- Changes in the patterns of storminess, such as an increase in the frequency or intensity of tropical cyclones, may cause greater incidence of coastal inundation and erosion events. These processes may be exacerbated by reduced reef protection.

Fiji, especially Viti Levu, already suffers from human-generated effects on the coastal zone. High population growth rates, intensive urban development, deforestation of catchments, pollution and increased exploitation of biological and physical coastal resources have exposed large areas of coast to erosion and inundation events. Accordingly,

- Coastal systems have reduced resilience to cope with climate variability,
- Coastal systems have reduced capacity to adapt to climate change, sea-level rise and human activities, and
- Coastal populations and their assets are exposed to higher vulnerability to extreme events such as storm surges, tsunamis, and high tides, apart from sea level rise.

Water Resources

Impacts on the Suva Peninsula and Rewa Delta are likely to include:

- Raised water tables in low-lying areas,
- Reduced efficacy of in-ground septic systems and inundation of sewer pumping systems,
- Overtopping of the shore protection in downtown Suva during the more extreme wave events under a 25 cm SLR scenario,
- Serious flooding in large parts of Suva Point and downtown Suva even during moderate tropical cyclones under a 100 cm SLR scenario,
- Shoreward retreat of mangroves in the Rewa Delta, and
- Increased sedimentation in the channels of the Rewa Delta and increased flood susceptibility.

On Viti Levu it is important to distinguish between the southeast of the island, which is exposed to the prevailing tradewinds and is characterised by a moist climate, and the northwest which is the leeward, rain-shadow side and much drier. Usually, droughts have much greater impact on the drier, western side of the island.

The effects of climate change on water resources depend on the Global Circulation Model) GCM used. The CSIRO scenario indicates an increase in maximum and minimum stream flows, while the DKRZ model suggests the converse. It is possible that, as a result of climate change, extremes will be intensified. That is, low river flows will become lower and high flows will increase in volume, which implies higher risks of droughts and floods.

Agriculture

Sugar cane

Using the period from 1992 to 1999, when Fiji was subjected to two El Niño events and an unusually high number of tropical cyclones; as an analogue for future conditions under climate change it might be assumed that over the next 50 years:

- 47% of the years will have the expected production of 4 million tonnes,
- 33% of the years will have half of the expected production,
- 20% of the years will have three-quarters of the expected production.

The outcome under this scenario would be an overall shortfall in excess of one quarter of expected production. It implies economic difficulties for the large sector of the population in the agricultural sector dependent on sugar production and associated industries.

Root crops

Using the PLANTGRO model the following patterns were projected for dalo (Colocassia esculenta) and yams (Dioscorea sp.):

- Projected changes in mean conditions would have little effect on dalo production, with the exception of the extreme low-rainfall scenario using the DKRZ GCM which would result in a halving of the land area providing high yields. It is likely that yam production will also remain unaffected, although if rainfall increases significantly, yam yields may fall slightly.
- When El Niño conditions are factored in, reductions in, production of 30-40% might be recorded in one out of three years, with a further one in five years affected by the residual effects of the ENSO events.
- Using the same ENSO assumptions we find a converse response for yam production. In one out of three years yam production might be expected to remain the same or increase. On the other hand, yields may decrease in around half of the remaining years, especially when La Niña conditions prevail.

Health

The study concluded that the afflictions for which a clear link to climate change can be established are:

- Dengue fever,
- Diarrhoeal diseases,
- Nutrition-related illness.

Changes in dengue-fever epidemics were modelled using PACCLIM. It was found that climate change, through increasing temperature, would lead to increases in the risk of dengue-fever epidemics.

These findings suggest that climate change could result in:

- An increase in the frequency of epidemics
- A change in the timing (seasonality) of epidemics so they may occur in any month
- A larger number of people being affected by each epidemic. Under the B2 scenario numbers affected may increase by 40% by 2100, while under the A2 scenario the increase may be in the order of 100%.
- Increased number of fatalities
- Dengue becoming endemic (occurring all the time) rather than occurring in epidemics

Diarrhoeal disease may become more common if Fiji becomes warmer and wetter (as under the CSIRO scenario) and if droughts and tropical cyclones occur more frequently, disrupting water supplies and sanitation systems.

Nutrition-related illnesses are most likely to be affected by increases in frequency and/or magnitude of tropical cyclone and drought events. Further, it is also likely that if climate change leads to economic and social disruption and environmental degradation, disadvantageous effects on health may be serious.

- **Summary of National Adaptation Programme of Action (NAPA)**

Fiji has not submitted its NAPA to the UNFCCC.

- **Adaptation Options**

A number of adaptation priorities have been identified to reduce vulnerability to the anticipated impacts from climate change in the National Communications Report. The following were identified as various adaptation options for the four sectors evaluated in the assessment:

Coastal resources. Adaptation needs are identified as being:

- An improved understanding of the coastal system, examination and evaluation of coastal protection options;
- Land use policies that encourage settlement away from low-lying coastal areas;
- Mangrove and reef protection, including exploration of the use of artificial reefs to enhance coastal protection; alternative sources of construction aggregate (not coral); reducing use and cutting of mangrove areas; and mangrove rehabilitation;
- Controls on pollution from residential, tourism, commercial and industrial areas; and
- Water-catchment management and soil-conservation measures to reduce erosion and sedimentation.

Freshwater Resources. Needs in this sector have been identified as including:

- Flood Control–Construction of diversion channels, weirs, cut-off channels, retarding basins and dams; and river-improvement activities such as channel widening, dyke construction or river-bed excavation.
- Drought alleviation–Management of water resources; water legislation; development of alternative water resources such as groundwater and the use of roof catchments; and

consumer charges for water use.

- Catchment Management–Reforestation, land-use controls, protection of wetlands and soil conservation; reducing flood damage potential by regulating development on flood plains and promoting flood-proof building design; community level activities to improve awareness of water conservation and emergency response; and institutional development such as the creation of catchment and water authorities would help build capacity to improve the management of water resources.

Agriculture. Adaptation needs identified include:

- Researching flexible farming systems that are tolerant to climatic variability, development of sustainable production systems, and melding of traditional and modern systems.
- Establishment of an Agricultural Diversification Scheme (under the Commodity Development Framework).
- Cessation of sugarcane production of marginal sloping lands and coastal lands, and intensified irrigation of sugar cane production on better lands.
- Strengthening of land use planning in order to identify most suitable areas for adaptation commercial and subsistence based crops.
- Root crop breeding program and development of improved irrigation systems.

Human Health. The needs for human health adaptation are:

- Dengue Fever control: encourage prevention, improve quarantine, epidemic preparedness response and implement proper development policies.
- Diarrheal Disease: improve reliability, safety and sanitation of water, refrigeration practices, emergency strategies and health care access.

5. Key industries and economic activities

Fiji's main industries are tourism, sugar, clothing, copra, gold, silver, lumber, small cottage industries. Fiji, endowed with forest, mineral, and fish resources, is one of the most developed of the Pacific island economies though still with a large subsistence sector.

Sugar exports, remittances from Fijians working abroad, and a growing tourist industry - with 400,000 to 500,000 tourists annually - are the major sources of foreign exchange. Fiji's sugar has special access to European Union markets but will be harmed by the EU's decision to cut sugar subsidies. Sugar processing makes up one-third of industrial activity but is not efficient. Fiji's tourism industry was damaged by the December 2006 coup and is facing an uncertain recovery time. In 2007 tourist arrivals were down almost 6%, with substantial job losses in the service sector, and GDP dipped.

The coup has created a difficult business climate. The EU has suspended all aid until the interim government takes steps toward new elections. Long-term problems include low investment, uncertain land ownership rights, and the government's inability to manage its budget. Overseas remittances from Fijians working in Kuwait and Iraq have decreased significantly. Fiji's current

account deficit peaked at 23% of GDP in 2006, and has been improving since that year.

6. National development strategy

Sustainable Development

Overexploitation of resources and unsustainable management practices will affect the socio-economic fabric of Fiji as well as reducing the resilience of the environment and increasing its vulnerability to the adverse effects of climate change. Therefore the Fiji government has developed and will be developing various sustainable management policies with the realisation that such polices will be the most beneficial response strategy to help cope with climate change and other environmental and socio-economic problems.

This strategy is in line with the Principles contained in Article 3 of the UNFCCC which refers to the development of policies and measures related to sustainable development, by parties, to protect the climate system against human-induced change, and these should be integrated with national development programme. Fiji's sustainable development policies are categorized under six broad areas, namely:

- Macro Economic Stability;
- Natural Resource Utilization;
- Physical Infrastructure;
- Social Development and Affirmative Action;
- Protection of the Environment; and
- External Relations.

Sectoral Policies

Land Resources

The Department of Land Planning and Development undertakes planning, development and management of land resources. A land-use plan is expected to be completed for the whole country by 2010.

Policies for the sustainable development and management of land resources are:

- Ensuring sustainable utilization and development of land;
- Creating a leasing system that is mutually beneficial to both land owners and tenants;
- Minimising degradation of land; and
- Consolidating and updating all land databases and information.

Marine Resources

For sustainable development of fisheries and marine resources, the following policies are being pursued:

- Enacting Sustainable Development Bill provisions relating to fisheries resources;
- Promoting production and export of value-added fisheries products;
- Providing appropriate institutional and physical infrastructure to support development in the sector; and
- Increasing community participation through ownership in fish-processing companies.

Watershed and Freshwater Management

The National Environment Strategy provides a strategic approach to water management. With the assistance of the Japanese Government, Fiji is finalizing a watershed management plan, in particular to address flood control and protect arable land.

Forestry

Policies for sustainable forest management include:

- Ensuring sustainable development and management of forestry resources;
- Promoting of community-owned and managed forestry processing and value- adding facilities based on indigenous forests and community-owned plantations;
- Providing the appropriate institutional and physical infrastructure to support the development of the sector; and
- Promoting the production and export of value-added timber products.

Water and Sewerage

The Government, through the Water and Sewerage Section of the Public Works Department (PWD) of the Ministry of Works and Energy, is responsible for the construction, operation and maintenance of water supplies and sewerage services. The two priorities in the sector are:

- Providing access to reliable and adequate supplies of clean water for both urban and rural dwellers through expanding the rural water-supply scheme and the extension and upgrading of major urban and regional water schemes as outlined in their respective master plans; and
- Providing access to sanitary and environmentally safe sewerage waste systems and treatment facilities.

Energy

The Department of Energy (DoE) is responsible for policy and planning, the development of renewable energy resources, energy conservation and coordination of the rural electrification scheme. The policy priorities in the sector include:

- Ensuring access to reliable and affordable energy supply;
- Assisting rural communities acquire electricity for both social and economic development; and
- Developing cost-effective renewable energy sources for energy supply through undertaking technical and economic feasibility.

Health

The policies in the sector are:

- Providing efficient and adequate primary and preventative health services;
- Providing efficient curative (hospital) health care services;
- Maintaining appropriate level of human resources/staff;
- Maintaining appropriate infrastructure and facilities; and
- Building a management culture that promotes and supports continuous quality improvement.

Disaster Management

Reduction of the vulnerability of rural communities to disasters, such as cyclones and tsunamis, is undertaken through the Disaster Management Office under the National Disaster Management Act of 1998.

The priorities for the sector are:

- Mainstreaming Disaster Management into the national development decision making process;
- Ensuring the establishment of a comprehensive hazard and risk management plan;
- Improve community awareness of risk, preparedness and response; and
- Investing in infrastructure to mitigate the impact of disasters

Protection of the Environment

The proper management of the environment and sustainable use of its natural resources is critical for sustainable development of Fiji's largely natural-resource based economy. The Department of Environment is responsible for better coordination, effective formulation and implementation of national environmental policies.

Policies for the sustainable management of the environment include:

- Minimizing degradation of natural resources and protecting Fiji's biodiversity;
- Promoting and supporting sustainable waste management;
- Mitigating the effects of climate change;
- Enactment of the Sustainable Bill; and
- Public Awareness and Education

Fiji is committed to implementing adaptation measures on the effects of climate change at the community level and is now involved in an adaptation project, funded by the Canadian government. The project is being executed by SPREP that implements adaptation measures as highlighted in the PICCAP programme. Part of this commitment is the empowerment of the vulnerable communities to adapt to the changing climatic conditions to sustain their livelihood in the long run. Results of studies done on the effects of climate change and their integration into development policies and plans form part of a broad climate-change response strategy.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.20. ベリーズ

Belize

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Belize, although a minor contributor to global GHG emissions, can be severely affected by the impacts of climate change due to its long coastline, concentration of population in coastal area and dependence of some of its main economic activities, such as tourism and fisheries on those areas.

As such, Belize's climate change action is focused on building climate resilience, such as identifying and implementing adaptation actions in the areas of coastal and marine environment, fisheries, agriculture, tourism and water resources. At the same time, potential mitigation options are also identified in the areas of increased output of hydropower, introduction of co-generation in sugar cane industry and introduction of solar panels in villages.

2. Summary on climate change related issues in the country

- **Climate change policy**

Belize ratified the United Nations Framework Convention on Climate Change (UNFCCC) in October 1994 and Kyoto Protocol in September 2003. Belize submitted its initial national communication under the UNFCCC in September 2002 and second national communications in October 2011.

Belize places its priority on promoting sustainable economic and social development and the reduction of poverty. As for climate change policy, the emphasis is on building climate resilience.

- **National efforts / measures against climate change**

The National Meteorological Service (NMS) is the principal advisor and negotiator for the government of Belize on climate change matters. The Chief Meteorologist is the Focal Point for the UNFCCC. In the process of preparing the second national communications (SNC), the National Climate Change Committee (NCCC), first established in 1995, was reactivated to provide oversight function for the formulation of SNC. NCCC is also responsible for assisting the government with managing climate change in Belize. Follow-up tasks for NCCC include among other things, guidance on completing the review and adoption of the National Policy on Adaptation to Climate Change.

Climate Change Office in Ministry of Forestry, Fisheries and Sustainable Development is designated national authority for CDM. Belize is involved in one of multiple countries Programmatic CDM projects under validation. The project aims to replace existing and

predominant use of kerosene-based lighting with purpose designed LED/CFL lamps in the household.

NMS has been in the forefront of the implementation of measures against climate change. Measures that have been carried out to date include the following.

SYSTEMIC OBSERVATION AND RESEARCH

In order to provide adequate high quality, systematic and comprehensive observations to effectively assess climate change and its potential impacts as well as to develop effective mitigation and adaptation strategies, NMS placed its focus on effective implementation of Global Climate Observing System (GCOS) and securing its quality. Measurements to be taken include Atmospheric Essential Climate Variables, Oceanic Essential Climate Variables and Terrestrial Essential Climate Variables

CAPACITY BUILDING

Belize has made efforts to build capacity to address climate change issues in both the public and the private sector. Further education opportunities have been provided to NMS staff while representatives of the private sector were also given opportunities to learn by participating in regional and international workshops.

PUBLIC AWARENESS AND EDUCATION

Extensive effort has been made to increase public awareness with regards to the climate change.

- National Symposium on Climate Change
- Youth Initiative Regarding Climate Change
- School Contests on Climate Change

3. Sustainable Development and Mitigation

● National inventory of greenhouse gas

The Greenhouse Gas Inventory was conducted for reference years 1997 and 2000 in the following sectors: Energy, Industrial Processes & Solvents, Agriculture, Land Use, Land-Use Change & Forestry and Waste. As seen in the following table, total GHG emissions as well as emissions in sector are on a rapidly increasing trend. However, Belize's contribution to GHG emission on a global scale still remains extremely small.

Belize's two main sources of Energy at the study period were from imported fossil fuels, and biomass. Biomass includes the burning of bagasse in the sugar industry, consumption of fuel wood for domestic use, and the production of white lime. In 1997 and 2000, emissions from fuel combustion showed a steady decline when compared to the 1994 emissions; this being attributed to the reduction in utilisation of diesel by Belize Electricity Limited.

Activities within the Industrial Processes and Solvents Sectors occurred in only two areas: the Mineral Products, and the Food Production and Drink sub-sectors. Lime production and road

paving with asphalt are the principal activities in the Mineral Products sub-sector. Beer, wine, and spirits; meat, fish, poultry, bread, and animal feed are the products of the Food and Drink production sub-sector.

The percentage of emissions from the Industrial Processes sector, consisting of Mineral Products and Food Production and Drink sub-sectors, remained unchanged over the reference years. However emissions have increased from 1.73Gg in 1994 to 1.81 and 2.20 Gg for the Reference years 1997 and 2000 respectively.

Emissions of the Agriculture sector were from the same sources as those for the first inventory. Emissions increased from 54.8876 Gg in 1994 to 66.9793 and 100.44 Gg for reference years 1997 and 2000 respectively. Agricultural soils and prescribed savannah burning were the two main sources of GHG emissions. The agriculture sector was a net emitter of GHGs but accounted for less than 2% of the total national emissions.

Emissions in Land Use, Land Use Change and Forestry sector of are mainly from deforestation and soil carbon from agriculturally impacted soils. Emissions in this sector dramatically increased, from 2056 Gg in 1994 to 12,349 Gg in 2000 while the percentage in total also increased from 72.7% to 92% respectively.

Table 1: Total Estimates GHG Emissions by Sector (Gg) for Reference years: 1994, 1997 & 2000

Sector	**1994**	**% of Total**	**1997**	**% of Total**	**2000**	**% of Total**
Energy	617.5280	21.846	1,026.7511	12.600	1,127.2995	8.361
Industrial Processes & Solvents	17,350	0.061	18,001	0.022	21,972	0.016
Agriculture	46.414	1.642	1.5846	0.019	2.0825	0.016
Land Use Change & Forestry	2,056.3650	72.747	7,117.1762	87.340	12,349.2819	91.593
Waste	104.7000	3.704	1.5141	0.019	1.9158	0.014
Totals	**2,826.7426**	**100**	**8,148.8261**	**100**	**13,482.7769**	**100**

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Belize has not submitted its NAMA plan.

- **Mitigation Options**

Due to its low-level emissions on the global scale, Belize has not actively designed and implemented projects to mitigate climate change. However, some energy sector projects implemented or underway have the potential to result in reduction of GHG emissions. In

particular, some assessment of mitigation impact has been carried out on the following projects.

- Hydro-dams
- Co-generation in sugar industry
- Solid waste management
- Solar panel application

4. Adaptation and Vulnerability

● Vulnerability to climate change

The first assessment of Belize's vulnerability to climate change was conducted by Belize Centre for Environmental Studies (BCES) in 1994 to determine the vulnerability of the coastline to sea level rise done by. This area had been prioritized because of its low-lying nature, the concentrations of populations in this zone, the level of infrastructural development, and the range of economic activities occurring. For the preparation of the Second National Communication, it was decided that vulnerability assessments would be conducted in different but very relevant and important sectors in the Belizean development.

Agriculture Sector

Belize's economic growth and food security is highly dependent on its agricultural activity. There is moderate diversification of crops, and both food security and economic growth are at risk from the impending impacts of climate change.

The effects of climate change on crop production would differ depending on the crop involved. For example, while an increase in temperature might be detrimental particularly for certain crops, it could have a positive effect on some summer crops such as rice. With regard to precipitation, its increase could be detrimental to vegetable crops but favourable for rain fed perennial crops such as sugarcane and citrus. The effects of a decrease in precipitation would be opposite.

Coastal Zone

Coral reefs, seagrass beds, mangroves, and littoral forest are all vulnerable to the impacts resulting from severe weather events, including sea level rise and increases in temperature.

Fisheries and Aquaculture Industries

There is still an incomplete understanding of the link between climate change and fisheries. Despite the resilience of many species of fishery resources, their ability to overcome changes in weather patterns, including increased frequency and severity of extreme events, such as hurricanes, are uncertain.

The primary threats to the Fishing industry are increased sea surface temperatures, changes in pH and loss of habitat.

Potential climate change induced impacts to the Aquaculture industry considered in the study include (a) the increase of harmful algal blooms; (b) increased metabolic rate and growth due to the same cause; and (c) changes in migration and spawning, all as the result of increased

sea-surface temperatures.

Health Sector

Within the Health Sector, the Global Circulation Models for climate change projects that in tropical low latitude areas such as Belize, a warmer climate system resulting from a doubling in a Carbon Dioxide concentration in the atmosphere will lead to increased frequency of warm spells/heat waves, intense droughts, and heavy rainfall events. It is projected that these conditions will increase the risk and incidences of vector-borne diseases and illness.

Tourism Sector

The tourism sector of Belize highlights several areas of supply - and demand - based economic vulnerability to climate change, including the risks to coastal land and infrastructure, exposure to resource damages such as coral bleaching, and an associated reduction in demand because of resource changes or risks to personal health and safety. A preliminary assessment of Belize's tourism sector suggests that it is highly vulnerable to the effects of climate change through both its exposure to climate impacts and its weak capacity for adaptation.

Water Resources

An impact of climate change on the water sector is likely to be a continued deterioration in water quality brought about by a combination of decreased water runoff, agricultural pollution and increased urbanization. This will increase treatment costs for potable water as well as result in greater competition for the use of this increasingly scarce source. This could be the genesis of water conflicts.

Any reduction in availability of water especially for agriculture is likely to have an impact on food security. The northern and central regions of the country are the country's bread basket, where the overwhelming percentage of one of its major staples, rice, is cultivated.

Yet another impact of climate change on the water sector is increased frequency of salt water intrusion, which will increase as sea level rises. The economic impact on the water sector will surface when potable water supplies are affected by this intrusion resulting in increased treatment costs and decreased water quality.

- **Summary of National Adaptation Programme of Action (NAPA)***

Belize has not submitted its NAPA.

- **Adaptation Options**

Recommended adaptation measures indicated in Belize's second national communication are the following.

Agriculture Sector

- Altering inputs, varieties, and species for increased resistance to heat shock and drought, flooding and salinization; altering fertilizer rates to maintain grain or fruit quality, altering

amounts and timing of irrigation and other water management; altering the timing or location of cropping activities.

- Managing river basins for more efficient delivery of irrigation services and prevent water logging, erosion and nutrient leaching; making wider use of technologies to “harvest” water and conserve soil moisture; use and transport water more effectively.
- Making wider use of integrated pest and pathogen management, developing and using varieties and species resistant to pests and diseases; improving quarantine capabilities and monitoring programmes.
- Increasing use of climate forecasting to reduce production risk.
- Introducing forest conservation, agro-forestry and forest-based enterprises for diversification of rural incomes.

Coastal Zone

- Establish and Activate the National Climate Change Committee.
- Revitalize and strengthen the Coastal Zone Management Authority
- Reintroduce a periodic forum to address the issues surrounding the state of the Coastal Zone.
- Conduct a series of country-wide Baseline Assessments within the major habitats.
- Develop an incentive programme that encourages the private sector to actively participate in adaptation to climate change.
- Revise and streamline the current legislations and policies that relate to the management of the coastal zone to eliminate overlaps and close existing gaps.
- Improve the coordination of interagency cooperation and exchange of information on matters related to climate change.
- Develop strategies to increase compliance particularly with regard to coastal department.
- Develop a Public Awareness and Education Strategy.
- Consolidate and Strengthen the Marine Protected Area (MPA) system.
- Expand and Streamline the Ecosystem Monitoring Programme.

Fisheries and Aquaculture Industries

Fishery

- Adaptation to impacts of climate change on fishery habitat: The preparation of a National Fisheries Management Plan would help in providing guidance to fisheries managers to enable them to adequately deal with the impact of climate change on fisheries management.

- Adaptation to direct impacts of climate change on fishery stocks: Changes in stock distribution, recruitment levels and variability and adult biomass and production can be achieved by adjusting fishing efforts to levels that are consistent with yield levels that can be sustained by the changed populations.

Aquaculture

Measures range from technical prescriptions, such as the development and deployment and deployment of more heavily engineered cage designs for Cobia Culture and decrease in water exchange rates for inland pond systems, to policy interventions such as the development and implementation of site selection criteria for cage culture, and the definition of a zoning scheme for industry.

Tourism Sector

Measures include diversifying the portfolio of tourism offerings to emphasize inland attractions, planning for coastal development with greater caution, and considering the feasibility of artificial reefs as underwater attractions to alleviate some of the existing pressures on Marine Protected Areas.

Water Resources

Measures to improve efficiency should be applied by the commercial water suppliers, in extraction from the sources, storage, and delivery to customers. This will be important in the context of reduced water availability occasioned by climate change.

Another recommendation is to conserve the country's water resources. The recommendation is to provide incentives to encourage the use of more efficient irrigation equipment to minimize water losses and encourage conservation of the resource.

5. Key industries and economic activities

Although agriculture consisting mainly of sugar cane, citrus and banana export industry remains a mainstay of the economy, tourism has become the largest contributor to GDP and the number one foreign exchange earner, followed by exports of marine products, citrus, cane sugar, bananas, and garments. The government's expansionary monetary and fiscal policies, initiated in September 1998, led to GDP growth averaging nearly 4% in 1999-2007. Oil discoveries in 2006 bolstered this growth. Exploration efforts have continued and production has increased a small amount. In February 2007, the government restructured nearly all of its public external commercial debt, which helped reduce interest payments and relieved some of the country's liquidity concerns. Growth slipped to 0% in 2009, 2.7% in 2010, and 2.5% in 2011 as a result of the global slowdown, natural disasters, and a temporary drop in the price of oil. With weak economic growth and a large public debt burden, fiscal spending is likely to be tight. A key government objective remains the reduction of poverty and inequality with the help of international donors. Although Belize has the second highest per capita income in Central America, the average income figure masks a huge income disparity between rich and poor. The 2010 Poverty Assessment shows that more than 4 out of 10 people live in poverty. The sizable trade deficit and heavy foreign debt burden continue to be major concerns.

6. National development strategy

Horizon 2030 embodies the vision for Belize in the year 2030 and the core values that are to guide citizen behaviour and inform the strategies to achieve this common vision for the future.
It covers several thematic areas that are organised under the following4 main headings:

Democratic governance for effective public administration and sustainable development

Strong "watchdog" groups in the non-government sector hold politicians accountable.

- Persons in public life demonstrate the highest ethical standards.
- Government departments are free of corruption, modernized and focused on providing quality service to the public.
- Party politics is in its proper place so that it is less intrusive and divisive in the daily lives of citizens.
- Critical aspects of the political reform process are completed. Changes result in the effective separation of the legislature and the executive and the removal of ministerial discretion.
- The society is relatively free from violent crimes. The legal and judicial system is credible and capable of solving all kinds of crime and dispensing justice in an equitable and fair manner to all.

Education for Development - Education for Life and Lifelong Learning

- The most important goal is to provide quality education that is free and compulsory to at least the secondary school level.
- The second education goal is to ensure delivery of quality and relevance in the curriculum by integrating the expressive arts, sports and physical education, science and technology, environmental education, and entrepreneurship.
- The third goal is to create an education system that is inclusive, reflecting Belize's multi-ethnic, multi-cultural, multilingual society.

Economic resilience: Generating resources for long term development

- Increase agricultural production in a sustainable way and increase local values added through the development of agro-processing.
- Ensure a sustainable and profitable tourism sector.
- Develop a strong small business sector, a strong work force and a strong corps of entrepreneurs.
- Finally, a key long term goal is to ensure that government is able to make timely investments in key economic infrastructure.

The Bricks and the Mortar - Healthy Citizens and a Healthy Environment.

- Incorporate environmental sustainability into development planning and Strengthen Protected Areas Management
- Promote Green Energy

References

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2. Central Intelligence Agency, "The World Factbook" https://www.cia.gov/library/publications/the-world-factbook/
3. "NATIONAL DEVELOPMENT FRAMEWORK 2010-2030 NEW USER FRIENDLY VERSION 2" http://www.belize.gov.bz/ct.asp?xItem=2007&ctNode=345&mp=27

This summary was prepared based on the data/information publicly available as of June 2012.

2.3.21. マーシャル諸島

Marshall Islands

1. Mainstreaming adaptation/mitigation actions in the national development strategy

The national government of the Republic of the Marshall Islands (RMI) recognizes that measures could be implemented to reduce the country's dependence on fossil fuel, improve energy efficiency and test new energy technologies. The Government is interested in implementing a national policy on renewable energy and energy efficiency, and to seek a more sustainable energy future.

However, the Government of the RMI acknowledges that measures for mitigation of GHG emissions may need to be evaluated at a regional scale. To this end, the Government of the RMI will continue to participate in energy and mitigation studies with regional bodies with the aim of:

- identifying practical ways and cost effective measures that can be undertaken within the capacities and resources of the government, business, Marshall Islands Energy Company and the people of the Republic; and
- providing sites for projects where specific energy efficiency and mitigation technologies can be tested and trialled to prove their applicability to Pacific Island condition.

2. Summary on climate change related issues in the country

- **Climate change policy**

RMI ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 8 October 1992 and the Kyoto Protocol on 11 August 2003, and submitted their first National Communications Report on 24 November 2000.

Responding to climate change and adapting to changed conditions has implications for a range of national land use, planning, natural resources and environmental protection policies of the RMI. As well, there are significant policy implications with regard to foreign affairs. These policy implications reflects the complex array of issues confronting the national government, the local councils (in both urban and more remote island situations) and the wider community including the business interests and external aid and assistance organizations.

Policy implications of the potential impacts of climate change and accelerated sea level should be formally examined through a wide ranging review of current administrative, planning, natural resources and environmental policies, legislation and regulations. This review could be externally supported and facilitated. The review would seek to achieve the following objectives.

- ***Land Use and Planning*** Amend land use and planning policies to ensure the implementation of mechanisms needed to deal with the increased loss of shorelines and the threats imposed to private property and public infrastructure.

- ***Environment and Natural Resources*** Strengthen environmental and natural resources policies, legislation and regulations to include matters relating to climate change and accelerated sea level rise.
- ***Natural Hazard Management*** Enhance natural hazard management policies to enable urban and remote communities to deal with extreme events by way of droughts and storms.
- ***Administration and Management*** Initiate administrative arrangements and management policies to deal with the core sectoral concerns in terms of water resources, coastal resources agricultural resources, marine resources and human health.
- ***Human Health*** Develop a comprehensive suite of human health policies to address water borne diseases and other sicknesses that are related to climate induced change including those arising from poor water quality and nutrition.
- ***Solid and Liquid Waste Management*** Provide broad management policies for domestic solid waste and discharges of liquid effluent including consideration of a strategy to convert solid domestic and some industrial wastes to saleable energy.
- ***Foreign Affairs*** Enhance foreign policy frameworks to: further the role of the RMI as a partner in proactively addressing climate change issues in the Central Pacific; facilitate ongoing participation in regional and international forums and programs and meet the obligations under the UNFCCC.
- ***Centre of Excellence*** Develop policy to facilitate the establishment of a **Centre of Excellence** which will expand the role of the RMI in the international as well as national issues of Climate Change.
- ***Technology Exchange*** Provide technology exchange policies to address applied research and monitoring, information management (including geographic and other spatial information), technology exchange to cover adaptation measures and engineering responses to rapid shoreline erosion.
- ***UNFCCC National Communication*** Formalize the policy initiative for the PICCAP Country Team to ensure that the preparation of the National Communication and other reporting under obligations to the UNCCC are appropriately resourced.

- **National efforts / measures against climate change**

Overall, RMI determined that the most appropriate and effective adaptation measures and strategies are most likely to be those that will be beneficial even in the absence of climate and sea-level change. Such measures and strategies could be considered as “no regrets” adaptation options. Therefore, in the first instance, the capacity of the Marshall Islands to adapt to the effects of climate and sea-level change will largely be determined by its ability to address on-going environmental, social and economic problems.

Adaptation includes three main types of activities. First, there are adaptive actions that include activities targeted at specific sectors where climate change effects have been identified. Second, another group of adaptive measures are equally important and include general policies and actions by government to address some of the social driving forces of environmental problems which will heighten vulnerability to climate change effects. Third, it is also important to increase the capabilities of RMI to effectively implement adaptations.

The preferred program outlined by the regional intergovernmental approach documented in the by Dialogue Consultants and the South Pacific Applied Geoscience Commission (Ellis and Fifita 1998) contains a variety of elements, with a wide range of characteristics. No single implementation mechanism is suited to all of these. Past experiences in implementing many projects and measures provide a guide to the requirements for successful mechanisms.

From those experiences, and particularly the causes of failed projects, the criteria for a successful implementing agency are that it should:

- be, or represent, the beneficiaries;
- have a clear mandate for its programme;
- possess adequate technical and managerial skills;
- have, or have access to, adequate funding to complete the programme;
- be acceptable to all other parties involved;
- be free from confounding incentives; and
- be subject to effective external financial control.

Given the range of elements selected for a regional mitigation program, some suggestions can be made regarding the elements that would be appropriately handled by a variety of potential implementing agencies, including:

(1) Electricity utilities, including IPP's
(2) Government energy departments
(3) Government forestry departments
(4) Regional organizations
(5) Private and co-operative sector

Not able to be clearly slotted into any of the above categories is a sustainable mechanism for the ownership and maintenance of PV equipment. Ellis and Fifita (1999) report that many different mechanisms have been employed, but none have yet proved fully sustainable. Some innovation seems to be required. The character of an organization that would be able to meet all the requirements for long term sustainability is not yet clear, but some likely elements of such an organization would seem to be that it:

(1) be a special purpose utility business, so that it operates on a commercial basis and is not distracted by other lines of business, or confounding objectives;
(2) be a multi-country operation to obtain economies of scale in building strong technical and managerial capabilities;
(3) operate under contract to a regional organization, so that donor funding can be accessed for initial capital, and financial oversight and control provided;
(4) have funds to meet replacement costs built up in a secure trust fund; and
(5) possibly be partly or wholly privately owned to instil financial discipline.

The Government of the RMI is confident that regional integration of mitigation measures can be achieved.

The Marshal Islands has not set up a designated national authority and does not have any CDM projects.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

Prior to the report prepared by Magruder and Meier (1996) a national inventory of greenhouse gas (GHG) emissions for the RMI did not exist. The IPCC guidelines provided in the Workbook (Volume 2) were used in planning and conducting the inventory. The step-by-step instructions provided for calculating emissions of carbon dioxide and methane from three major source categories: energy, agriculture, and waste were calculated; and land use change addressed. The IPCC computer software provided by the PICCAP National Global Climate Change Inventory Programme was used with limited success. The tables from Magruder and Meier (1996), which summarize the tabulated results of the inventory, were not made available in their National Communications Report.

Energy

Only liquid fossil fuels are used in the RMI. All fuel is imported, and almost all liquid fossil fuels are imported by two companies: Marshall Energy Company and Mobil Oil. All data in fuel consumption worksheets were provided directly by these companies and found to be reasonably consistent with imported data found in the Marshall Islands. Statistical Abstract 1993 and 1994, published by the Office of Planning and Statistics. All calculations are based on the year 1994, as good data were available for this time period. With the exception of LPG, all commerce in fossil fuels is measured in US gallons as the sale and reporting unit. Because no conversion factors were given in the IPCC Guidelines, all data expressed in US gallons were first converted to pounds using a default weight of 7.2 lbs/US gallon and then converted to Kilotonnes for datasheet entry.

Industrial Processes

There are no data available for activities in the RMI which fall into the industrial processes category for the data year 1994.

Agriculture

Methane from livestock- Methane production from herbivores as a by-product enteric fermentation, a digestive process by which carbohydrates are broken down by microorganisms into simple molecules for absorption into the bloodstream. Both pigs and chicken produce methane. As with nearly all agriculture (with the exception of copra), livestock in the Marshall Islands is raised mainly by families for personal consumption. Most livestock consists of pigs or chickens. Estimated of animal numbers are subjective assessments published in the Statistical Abstract (OPS 1994). Some of these figures were provided in pounds produced yearly and were converted to numbers of individuals at the ratio of 3 pounds weight (lbs) per chicken and 200 lbs per pig.

Land Use

No estimates for land use and forest change are available at the present time. Most of the land area in the RMI is cultivated or partially cultivated in coconut, banana, breadfruit and pandanus. There has been some clearing of forested areas for taro and vegetable production, but it is primarily subsistence agriculture. The RMI Government currently has no system of agricultural surveys.

Waste Management

Landfills The data used is based on population estimates of the densely populated urban areas of Majuro and the island of Ebeye. Solid waste is managed only in these two areas. Landfills in the Marshall Islands are about 80ft wide on reef flats.

Domestic and commercial wastewater The data used is based on population estimates of the densely populated urban areas of Majuro and the island of Ebeye. Wastewater is managed only in these two areas. After primary treatment, wastewater is discharged into the deep ocean on the outer reef slope.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

RMI submitted their NAMA on 27 January 2010 stating the goal of achieving a 40% reduction of CO2 emissions below the 2009 levels by 2020. This is pursuant to the 2009 National Energy Policy and Energy Action Plan, and with subject to the provision of adequate international support.

- **Mitigation Options**

RMI's involvement in the Pacific Islands Climate Change Assistance Programme (PICCAP) concluded that the individual national programmes should cover:

- **demand side**: education on air conditioner and refrigerator installation and operation, and in-country assessment of ground transport; and
- **supply side**: wind energy assessment, sustainable photovoltaic (PV) management, and options for efficiency increase in power supply.

The recommendations from the PICCAP's Regional Mitigation Meeting in 1998 set out two major initiatives following on from the initial study. These are to:

- develop feasible management structures for renewable energy implementation; and
- design a package of mitigation options for submission to financial institutions.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

The major impacts that climate change is projected to have in the Marshall Islands are sea level rise and associated shoreline erosion (EPA, 2000). This observation reflects the low-lying nature of the atolls the form the country; its highest point of land is found on the island of Likiep and extends 10 meters above sea level (CIA, 2011). In its Initial National Communication to the UNFCCC, the Marshall Islands identified the following sectors as being particularly vulnerable to climate change: water resources, coastal resources, agriculture resources, marine resources (including fisheries) and human health (EPA, 2000).

SOCIOECONOMIC SECTOR	EXAMPLES OF EFFECTS OF CLIMATE INDUCED CHANGES
Water Resources	♦Changes in freshwater lenses and other groundwater resources ♦Salt intrusion of groundwater resources ♦Changes in surface water resources ♦Changes in surface run-off, flooding and erosion
Coastal Resources	♦Inundation and flooding of low-lying areas ♦Coastal erosion ♦Possible increase in cyclone related effects ♦Changes in sediment production due to changes in coral reef systems ♦Coral bleaching and coral degradation (also possible increased upward coral growth) ♦Changes in mangrove health and distribution ♦Degradation of sea grass meadows
Agricultural Resources	♦Changes in commercial crop yields ♦Changes in subsistence crop yields ♦Changes in plant pest populations ♦Possible changes associated with changes in ENSO, drought and cyclone patterns ♦Changes in soil quality
Marine Resources	♦Changes in distribution and abundance of offshore fish species ♦Changes in productivity of inshore fisheries ♦Changes in fish breeding sites
Human health	♦Increased incidence of vector borne diseases such as dengue fever ♦Increased heat stress and heat related illnesses ♦Indirect effects on nutrition and well-being secondary to effects in other sectors such as agriculture and water resources ♦Deaths, injuries and disease outbreaks related to possible increases in extreme events such as cyclones, floods and droughts

- **Summary of National Adaptation Programme of Action (NAPA)**

RMI has not submitted its NAPA to the UNFCCC.

- **Adaptation Options**

A number of adaptation priorities have been identified to reduce vulnerability to the anticipated impacts from climate change in the National Communications Report. The following were identified as various adaptation options for the five sectors evaluated in the vulnerability assessment above:

Socioeconomic Sector	Impacts	Measures /Considerations
Water Resources	**Water shortages** (lower rainfall averages, longer more intense droughts, groundwater salt intrusion)	**Increase / improve supply:** Groundwater protection Increase water storage facilities Rainwater catchment Desalination Water catchment protection **Decrease demand:** Water conservation measures Leakage reduction Duel water supply systems Type of economic development
	Flooding (from run-off) (higher average rainfall, more tropical storms and cyclones)	Watershed protection Watershed management Positioning of infrastructure and buildings Design of infrastructure and buildings Protection of infrastructure and buildings
Coastal Resources	**Inundation and flooding**	Coastal protection Positioning of infrastructure and buildings Design of infrastructure and buildings Protection of infrastructure and buildings
	Coastal erosion	Coastal protection Coastal Vegetation Beach nourishment
Agricultural Resources	**Decreased crop yields due to low rainfall / pest outbreaks**	Drought resistant varieties Change crop types Diversify crops Maintain subsistence sector Avoid monoculture strategies
	Decreased crop yields due to salt intrusion (e.g. taro)	Salt resistant crop varieties
	Storm damage	Maintain subsistence sector Crop diversity
Human Health	**Increase in vector borne disease risk (dengue fever and malaria)** (raised average temperature)	**Decrease mosquito breeding sites:** Decrease artificial breeding sites (litter, solid waste, other potential containers) Cover water containers **Prevent entry of mosquitoes:** Port controls Quarantine regulations **Prevent exposure:**

		House design Mosquito nets, etc
	Heat stress / comfort (higher temperatures)	Building design / materials Traditional building styles Shade trees
	Disease outbreaks (floods, cyclones)	Optimise sanitation infrastructure design Disaster preparedness Town planning / land use planning

5. Key industries and economic activities

US Government assistance is the mainstay of this small island economy. The Marshall Islands received more than $1 billion in aid from the US from 1986-2002. Agricultural production, primarily subsistence, is concentrated on small farms; the most important commercial crops are coconuts and breadfruit. Small-scale industry is limited to handicrafts, tuna processing, and copra. The tourist industry, now a small source of foreign exchange employing less than 10% of the labour force, remains the best hope for future added income. The islands have few natural resources, and imports far exceed exports. Under the terms of the Amended Compact of Free Association, the US will provide millions of dollars per year to the Marshall Islands (RMI) through 2023, at which time a Trust Fund made up of US and RMI contributions will begin perpetual annual payouts. Government downsizing, drought, a drop in construction, the decline in tourism, and less income from the renewal of fishing vessel licenses have held GDP growth to an average of 1% over the past decade.

6. National development strategy

The following have been identified as future needs that must be urgently addressed if the people of the RMI are to be able to effectively respond to the challenges arising from climate induced changes to the physical, biological, social, economic and cultural conditions on the atolls and islands of the Republic.

- ***Human Resources:*** It is vital that the issues of climate change both politically and technically are met with an understanding by RMI. There needs to be adequate personnel given full attention to making sure that RMI understands the international issues in the negotiations and the technical issues to be able to make proper decisions and respond to the effects of climate change.
- ***Institutional Strengthening.*** Governmental and other institutional strengthening is needed to ensure that the government departments are adequately structured, equipped with the appropriate skills and tools and are capable of delivering an integrated response to the challenges arising from climate change and accelerated sea level rise.
- ***Management and Operational Training.*** Project management and operational training is needed for the governmental and non-governmental stakeholders involved in climate

change programs and the implementation of adaptation projects.

- ***Applied Research Assistance.*** Specific applied research assistance is needed for the selection of representative atolls and islands and determining the parameters and indicators for the accurate documentation of base line conditions from which to measure climate induced changes to the shorelines, reef and island ecosystem and affected settlements and communities.
- ***Professional and Technical Support.*** Adequate support is needed at the professional and technical levels for: carrying out vulnerability and adaptation assessment; the preparation of integrated coastal zone management plans; and the implementation of projects to manage the physical, economic, social and environmental changes.
- ***Appropriate Funding.*** Financial support is needed for baseline bio-physical and socio-economic environmental research, monitoring changes to environmental conditions and implementing adaptation measures.
- ***Information Management Systems.*** Appropriate systems are needed for spatial and other data generated through vulnerability assessments, monitoring programs, integrated coastal zone management planning and the implementation of adaptation projects.
- ***Confidence and Capability Building.*** Confidence and capability building programs are needed for government departments, members of local councils and nongovernment organizations.
- ***Awareness and Education.*** Community awareness and education programs are needed that are aimed at students at elementary and high schools and the College of the Marshall Islands as well as public and private sector bodies and island residents and visitors. This area needs to be developed and strengthened.
- ***International Participation.*** Proactive participation and lobbying initiatives in international forums and meetings are needed with the aim of continuing to keep the issues confronting small island states, when they are responding to climate change, in front of representatives and citizens of the industrialized nations.
- ***PICCAP Country Team.*** An adequately resourced and trained RMI PICCAP Country Team is needed to ensure that the preparation of the National Communication and other reporting under obligations to the UNFCCC are met and that a whole of government approach is applied to resolving climate change issues. It is vital for the Country Team to continue its work, perhaps as a functioning body of the National Commission on Sustainable Development. Consideration must be given by the Conference of the Parties for financing the country teams in the interim period between national communications.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.22. ミクロネシア連邦

Federated States of Micronesia

1. Mainstreaming adaptation / mitigation actions in the national development strategy

As a small islands developing nation, the Federated States of Micronesia (FSM) is one of the countries most directly threatened by long-term global warming resulting from an increased level of greenhouse gases accumulating in the earth's atmosphere. Regarding the effects of global warming, as a coastal nation, the FSM is particularly vulnerable to accelerated sealevel rise. And, because of the country's geographic location, future global warming holds the possibility of creating more frequent, intense, or longer-lasting El Nino droughts.

Yet, the nation's human-sourced greenhouse gas emissions represent a negligible percentage of the world's total human-sourced release of carbon dioxide, methane, nitrous oxide, and other greenhouse gases into the atmosphere. It has even been speculated that because of the "sink" capacity of its extensive forest and coral reef systems, the nation may produce a net "uptake" of greenhouse gases. Still, the FSM acknowledges an international obligation, and values the opportunity, to act in "good faith" by joining with other responsible nations in a concerted effort to undertake reasonable source-oriented mitigation measures in order to control the level of greenhouse gases emitted into the atmosphere.

As the FSM begins to undertake a comprehensive environmental management response strategy that includes implementation of both adaptation and mitigation measures, the nation will begin to maximize its potential contribution toward controlling global greenhouse gas emission levels by sustaining or increasing the "sink" (or "uptake") capacity of its coral reefs, and coastal and upland forests.

2. Summary on climate change related issues in the country

- **Climate change policy**

The FSM ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 18 November 1993 and the Kyoto Protocol on 21 June 1999, and submitted their first National Communications Report in 1997.

Taking into account the FSM's unique climate change vulnerabilities, as well as other domestic and international considerations; it has been determined that the most effective national policy for the FSM involves developing a response strategy that addresses both the effects and sources of those climate change phenomena that are most likely to have an adverse impact on the FSM in the short-term and long-term. This national response strategy will emphasize (1) undertaking both effect-oriented adaptation and source-oriented mitigation measures, and recognize (2) the 'value-added' benefit of those "combined" measures that provide for both adaptation and mitigation outcomes at the same time.

Since changes in climate are likely to first create physical and biological impacts on the FSM, which in turn will have social and economic repercussions, a national response strategy oriented toward undertaking adaptation and mitigation measures that help prevent or minimize biophysical impacts will also help to preclude or lessen socio-economic impacts. Therefore, the most prudent climate change response strategy will be for the FSM to focus its limited resources on implementing measures involving environmental management.

- **National efforts / measures against climate change**

The FSM national government's ability to respond effectively to global and regional climate change faces a major challenge in that, in the arena of environmental matters, the constitutional allocation of responsibilities between the national and state governments is not clear. To date, in most cases, management and enforcement of environmental resources has been delegated to or assumed by the states. Over the past few years, a tentative understanding has emerged between the national and state governments. It is now generally accepted that the states have the primary responsibility for control and management of the environment, and the national government has an important role to play in coordinating state activities and providing technical assistance.

As their national communication outlines in some detail, to effectively contend with the FSM's major climate change vulnerabilities, both short-term and long-term, the nation must work cooperatively to achieve a common goal*: The conservation and sustainable use of its coral reefs and other associated ecosystems.* This goal can be reached with the active support and involvement (i.e., commitment of financial, technical, manpower, and other needed resources) of stakeholders at all levels: international, regional, national, state, municipal, and community. Attaining this goal can be facilitated by the active participation of private sector businesses, and governmental, non-governmental, and other agencies, organizations, and institutions. In adopting a climate change response strategy that emphasizes environmental management, wherever possible, the FSM's policy approach was to encourage a combination of incentives (or disincentives), and public awareness and "grass-roots" participatory community development programs and methods in the design and implementation of adaptation and mitigation measures.

The key to achieving the conservation and sustainable use of the FSM's coral reefs and associated ecosystems resides within the local communities. The people who live, physically and spiritually, as a natural part of these fragile ecosystems will have to decide whether or not to make the commitment for themselves, and on behalf of their future generations, to adopt and implement a comprehensive, fully participatory, community-based management approach to their environment.

The FSM has not set up a designated national authority and does not have any CDM projects.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

The FSM Greenhouse Gas Inventory addressed national emission estimates for applicable sectors: Energy, Industrial Processes, Solvent Use, Agriculture, Land Use Change and Forestry, and Wastes. Succinctly stated, the nation's human-sourced greenhouse gas emissions represent a negligible percentage of the world's total human-sourced release of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and other greenhouse gases. For example, the country has estimated yearly emissions from the energy sector, its largest source of greenhouse gas emissions, of about 146.0 gigagrams of carbon dioxide. And, there are no greenhouse gases emitted from industrial sources. In fact, it has been speculated that because of the "sink" capacity of its extensive forest and coral reef systems, the nation may produce a net "uptake" of greenhouse gases.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Federated States of Micronesia has not submitted its NAMA plan. However, as presented in the "Mitigation/Adaptation Options" sections below, the National Communication of the country raises several mitigation measures for the country.

- **Mitigation Options**

The FSM has identified six interconnected sectoral and four cross-sectoral areas of interest in which effect-oriented adaptation and source-oriented mitigation measures need to be adopted to address the known and potential impacts of the above four national climate change priorities. For each of the following areas of interest, a number of environmental management and other related measures have been outlined in the national communication which could be cooperatively undertaken by the national and state governments to effectively contend with the FSM's major climate change vulnerabilities.

Sectoral Areas	**Cross-Sectoral Areas**
Coral Reef Ecosystems	**Public Awareness Programs**
Coastal Zone Ecosystems	**Research Programs**
Waste Management	**Technology Development & Transfer**
Upland Forest Ecosystems	**Interagency Strengthening**
Agriculture/Agroforestry	
Water Supply	

The environmental management focus of the sectoral and cross-sectoral climate change measures outlined in the FSM national communication has been selected based upon a simple truth: *The social, cultural, and economic prosperity of the Federated States of Micronesia has been and will continue to be directly dependent upon the health of its coral reefs and interconnected ecosystems.* In the arena of climate change, this truth remains paramount. If the FSM is to effectively cope with climate change impacts, the nation must build an appropriate

local strategy, capacity, and acceptance of responsibility for management of its coral reefs and other interrelated ecosystems. Successful local implementation of such an effort will depend upon the support, cooperation, and full participation of all important stakeholders, especially customary owners and users of these resources.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

The national government has identified four climate change phenomena which, over the short-term and long-term, represent a significant threat to the well-being of the environment and people of the Federated States of Micronesia. These priority vulnerabilities are: Accelerated Sea-Level Rise, El Nino Events, La Nina Events, and Greenhouse Gas Emissions.

Climate Change Priorities	Short-term	Long-term
Accelerated Sea-Level Rise		**X**
El Nino Events	**X**	**X**
La Nina Events	**X**	**X**
Greenhouse Gas Emissions		**X**

With regard to these four national climate change priorities, the FSM has concluded that:

- Over the long-term, if the FSM's coral reefs do not remain intact and healthy, **Accelerated Sea-Level Rise** represents a dire climate change threat to the entire nation, both high islands and atolls, due to coastal inundation, erosion, and flooding due to wave and storm surge.
- Over both the short-term and long-term, **El Nino** episodes represent a significant climate change threat to the FSM because of the drought conditions they cause. And, due to global warming, **El Nino** events could become more frequent, intense, or longer-lasting in the future. Thus, over the next century, **El Nino** episodes may come to pose an even greater threat to the FSM.
- Over both the short-term and long-term, **La Nina** episodes represent a climate change threat to the FSM because of the heavier than normal rainfall, flooding, and wave and storm surge conditions these events cause.
- Over the long-term, global warming caused by increased human release of **Greenhouse Gas Emissions** into the atmosphere represents a grave climate change threat to the FSM for two reasons: (1) The inevitable acceleration in the rise of sea-level that will be caused; and (2) the potential increase in the number, strength, or duration of **El Nino** events and the resulting drought conditions these episodes cause.

The national government remains concerned about the potential influence of climate change phenomena on typhoon activity. However, typhoons were not selected as a national climate change priority on the basis of the best available, but still inconclusive, scientific evidence on the affects of El Nino episodes and global warming on typhoon activity in the FSM and adjacent regions.

- **Summary of National Adaptation Programme of Action (NAPA)**

The FSM has not submitted its NAPA to the UNFCCC.

- **Adaptation Options**

In its National Communications Report, the FSM has identified six interconnected sectoral areas of interest in which effect-oriented adaptation measures need to be adopted to address the known and potential impacts of the four priority climate change phenomena identified in the previous section. For each of these areas of interest, a number of environmental management and other related measures have been outlined in this communication which could be cooperatively undertaken by the national and state governments to effectively contend with the FSM's major climate change vulnerabilities. Following are a list of these sectors and their corresponding adaptation options:

Coral Reef Ecosystems

- Develop a sustainable community-based coral reef protection program modelled upon Pohnpei's Watershed Protection Program. Ensure this program integrates protection components for coastal zones, forests, and other relevant areas.
- Create marine protected areas that provide for the customary harvesting of reef resources by Micronesians using traditional collection methods.
- Assess which reef fishery stocks have been overexploited (e.g., rabbit fish and sea cucumber). During certain seasons prohibit harvesting of, place catch limits on, or close specific fishing areas populated by those reef fishery stocks that have been depleted due to this overexploitation.
- Ban or permit only seasonal use of imported fishing nets.
- Create a FSM "National Coral Reef Protection 'Green Seal' of Approval" to award to private sector visitor industry and related businesses that undertake specified measures to meet predetermined, strict coral reef ecosystem protection criteria. Publicize through nationally controlled media sources (e.g., tourism literature, Internet websites) which businesses have earned this award. Give these businesses award decals to display at their sites and allow them to publicize that they have earned this award in their own business advertisements and literature.
- For existing and new residential and commercial building construction, provide a yearly rebate (i.e., a scaled percentage up to some maximum) of the owner's total electric bill if the structure meets certain predetermined, strict criteria for coral reef ecosystem protection. For example, one criterion might be the replanting of bulldozed or cleared hillsides or beach areas with trees, shrubs, and plants that have been identified as effective in preventing erosion and stabilising the particular land in question. Another criterion might be whether or not a beach structure is built on stilts.
- Enforce a strict ban on the use of dynamite, bleach, cyanide, and other poisons for fishing.
- Develop market-driven (dis)incentives that discourage or minimize the large-scale commercial dredging of coral and sand.
- At popular diving and fishing sites, work with private sector stakeholders to construct permanent mooring buoys to minimize the destruction of coral due to the dragging of boat

anchors. Two examples of this are the mooring buoy projects undertaken in Kosrae and Yap States.

Coastal Zone (and Coral Reef) Ecosystems

- Ensure that a community-based coral reef protection program encompasses sustainable management of coastal areas adjacent to the shoreline.
- Undertake widespread, large-scale mangrove reforestation.
- Discourage the harvesting of mangroves for firewood and building material, and the clear-cutting of mangrove areas for home sites or to "open up a view" of the lagoon or ocean.
- Place a nationwide moratorium on commercial mangrove logging until sustainable yields can be determined and suitable regulations established to ensure over-harvesting does not take place.
- Encourage maintenance or restoration of the natural vegetation that grows along the back edge of and directly behind beaches -- mostly plants and shrubs adapted to sunny, windy and salty conditions.
- Utilize Micronesian technologies and practices to promote shoreline stabilization and coastal area ecosystem preservation. Discourage the use of contemporary seawall, groyne, and revetment construction. Three examples of these types of local measures are (1) the nearshore "Sea Fences" in Yap, (2) the nearshore "Staggered-stone Sea Fences" in Yap, and (3) the use of stilts in construction of shoreline structures as in Kosrae.
- Create and strictly enforce a ban on the purchase for commercial resale of any size female mangrove crab, and any male mangrove crab with a shell less than a prescribed number of inches across from "horn to horn."
- Complete climate change vulnerability assessments for each state in the FSM. Based on these studies, develop a comprehensive and detailed set of GIS coastal inundation zone maps for the FSM. Make this set of maps readily available to citizens, the private sector, government agencies, and any other stakeholders as a means of informing their decisions with respect to long-term coastal planning and development efforts (e.g., infrastructure, human settlement, cultural and historical site preservation, resort construction).

Waste Management (and Coral Reef & Coastal Zone Ecosystems)

- Identify suitable inland landfill sites for major dumps or local garbage pits for urban, rural and outer island communities throughout the nation. Shift solid waste disposal to these more appropriate locations and ensure the sites are properly managed. Facilitate the establishment of private sector refuse collection businesses to deliver garbage to these new dumps or garbage pits.
- Undertake a comprehensive nationwide recycling program for packaging and other types of products made of plastic, aluminium, and glass. Subsidize funding for this effort through a refundable deposit on major packaging products (e.g., aluminium cans, plastic and glass bottles, plastic bags).
- Ban or create (dis)incentives that discourage the use or random discarding of all plastic packaging products (e.g., plastic bags, plastic "six-pack" rings) that have been shown to be detrimental to the reef ecosystem including corals, turtles, and sharks.
- Develop and implement a long-range plan for the adequate treatment and disposal of urban

and rural area human sewage, and waste from rural area commercial livestock operations.

Upland Forest (and Coral Reef & Coastal Zone) Ecosystems

- Where appropriate, ensure that an upland forest (watershed) protection program component (modelled after Pohnpei's Watershed Protection Program) is integrated into any nationwide community-based coral reef protection program (which would also have a component encompassing the sustainable management of coastal areas adjacent to the shoreline).
- Facilitate the further development of Pohnpei's Watershed Protection Program, and extend this program model to the other states.

Agriculture/Agroforestry

- In a forecasted strong El Nino year, have state agricultural extension agents encourage farmers to plant appropriate local, normally 'dryland' crops in freshwater wetland areas such as taro patches, marshes, and swamps .
- Discourage widespread use of inorganic fertilizers and chemical pesticides.
- Create taro patches better able to tolerate saltwater intrusion by encouraging farmers to employ traditional taro patch composting practices on an extensive and continuing basis in order to build up soil level and fertility.

Water Supply

- Increase the available public water supply on high volcanic islands by identifying appropriate locations, drilling deep wells (bores), and constructing suitable water system infrastructure.
- Identify and construct appropriate (i.e., small-scale, low technology, low maintenance, inexpensive) solar desalination systems to increase the fresh potable water supply in atoll communities and other insular coastal areas. And, improve present community water systems on atolls and in other insular coastal and rural areas by constructing additional roof rainwater catchments.

5. Key industries and economic activities

The economy of the FSM is small, based on a small domestic market of about 106,000 people with modest levels of income and scattered over large distances. Infrastructure is not well developed and is generally inadequate for the increasing population; this is compounded by a low level of maintenance due to severe limitations on recurrent expenditure funds.

With the exception of offshore fisheries, there is a limited resource base, and a serious imbalance exists in external trade with as yet limited development of private sector activities outside of wholesale/retail and service industry sectors. The FSM is largely dependent on external aid and government sector activity. The current FSM National Development Plan recognizes that there is a marked dichotomy between the cash and traditional economies but that traditional values have been maintained.

The commercial and industrial sectors of the FMS consist primarily of small businesses,

complemented by a few larger public companies, co-operatives and credit unions. Few family-based businesses have entered the industrial sector, most being engaged in commercial import/export, wholesale and retail business or service enterprises such as restaurants, taxis, car rentals, repair and maintenance etc.

Tourism is an infant industry but already a significant contributor to the FSM economy in terms of employment, exports, and income. The visitor industry on Pohnpei is the single largest earner of foreign exchange in the State. All State economic development plans foresee considerable expansion of tourism activities for the coming decade and each State is now represented in the PATA (Pacific Air Travel Association) Micronesian Chapter which is the only active regional tourist association offering support and technical assistance for the development of international markets.

Current tourist activity emphasizes ecotourism, adventure tourism, and cultural tourism, and has centred largely on the attraction of marine, coastal and reef resources, and wreck dives, and the special prehistoric cultural attractions of the Lelu Ruins in Kosrae and Nan Madol Ruins in Pohnpei. Increased activity would continue to focus on these attractions, but the need for careful planning and management to ensure the preservation of the cultural and historical treasures is recognized. A precursor to realization of the great potential for growth of the tourism sector is investment in tourist infrastructure, including additional accommodation, better transport connections, and improved recreational activities.

6. National development strategy

The FSM President's Environmental Management and Sustainable Development (SD) Council was created in the mid-1990s to address matters, including climate change, affecting the environmental management and sustainable development of the nation, and make recommendations to the FSM President. The Council is composed of the FSM Vice President as Council Chair, and representatives from all four states and eight executive branch departments: The Office of Planning and Statistics, Department of Health Services, Department of Education, Department of Resources and Development, Department of External Affairs, Office of the Attorney General, Micronesian Maritime Authority, and the Office of Disaster Control. The purpose of the SD Council is to ensure that the national government takes a consistent stand on development and the environment, and to ensure that all available resources and technical abilities are tapped when providing coordination services and technical assistance to the states.

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This summary was prepared based on the data/information publicly available as of June 2012.

2.3.23. モルディブ

Maldives

1. Mainstreaming adaptation / mitigation actions in the national development strategy

Maldives is a non-annex I party to the UNFCCC and is not obliged to implement GHG mitigation measures. However, mitigation measures have been developed not only to reduce the Maldives emission of GHGs, but as a step towards achieving greater energy independence for sustainable development.

The mitigation of GHG emissions is possible by lowering the demand on the imported fossil fuel by increasing the efficiency in generating and utilising electricity and improving the efficiency of the transportation mechanisms. Reducing methane (CH4), the main source of emission of GHGs from landfills and sewage discharges, is another possibility. This can be achieved through improving the solid waste disposal methods, management practices and providing treatment of sewage discharges. The enhancement of the Maldives natural GHG sinks by increasing the vegetation cover and improving the health of the coral reef have been considered as possible mitigation options.

A National Implementation Strategy was developed to accommodate the main policy elements into the national planning. Through such policies, the Maldives should aim to benefit from the arrangements, such as the Global Environment Facility, activities implemented jointly under the Convention, and the Clean Development Mechanism under the Kyoto Protocol, resulting from the international climate change negotiations.

2. Summary on climate change related issues in the country

- **Climate change policy**

Maldives ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 9 November 1992 and the Kyoto Protocol on 30 December 1998, and submitted their first National Communications Report on 5 November 2001.

The Government, public and the private sector, as a whole needs to acknowledge the reality of climate change and associated sea level rise. The Maldives, being one of the countries most vulnerable to climate change, needs to incorporate effects of climate change in national development plans. New policies need to be developed and existing policies need to be strengthened.

The main policy elements can be identified as follows:
(2) Participate in international advocacy;
(3) Reflect climate change concerns in regulatory processes;
(4) Create sustainable financing mechanisms for programmes related to climate change

activities;
(5) Build, strengthen and enhance national capacity to adapt to climate change;
(6) Incorporate adaptive measures to climate change into national development planning; and
(7) Develop appropriate measures to mitigate greenhouse gas emissions

- **National efforts/measures against climate change**

In addition to local environmental concerns, the Maldives Government has continued to work in the wider international context because of the potential threats posed by externally generated problems and the collective responsibility for sustainable development at the global level. The Second National Environment Action Plan (NEAP II) emphasises climate change and associated sea level rise as a primary concern of the Maldives. Thus, the Maldives has continued to participate in international fora, calling attention to the fragile nature and special vulnerability of small islands.

Current national environmental policies are based on the need to take an integrated approach to environmental management and to work towards the goal of sustainable development. This is reflected in the NEAP II, which is the main guiding document for developing national environmental polices.

The NEAP-II has set its strategies and priorities with the aim to "protect and preserve the environment of the Maldives, and to sustainably manage its resources for the collective benefit and the enjoyment of the present and future generations."

The NEAP-II further indicates the need for strengthening the environmental law, environmental administration, education and public aware-nests, science and research, and the human resource capacity of the country. The issues identified as priorities are:

- climate change and sea level rise;
- coastal zone management;
- biological diversity conservation;
- integrated reef resources management;
- integrated water resources management;
- management of solid wastes and sewage;
- pollution control and managing hazardous waste;
- sustainable tourism development;
- land resources management and sustainable agriculture; and
- human settlements and urbanisation.

Apart from the polices and measures outlined in the NEAP II, the importance of sound practices for environmental and natural resources management is stressed in various parts of the fifth National Development Plan (NDP-5). The NEAP II and the NDP-5 have been developed with the view to maximise the sustainable use of natural resources, while paying due attention to the constraint that the island communities are small and widely dispersed over the country.

A National Implementation Strategy was developed to accommodate the main policy elements

into their national planning. Through such policies, the Maldives should aim to benefit from the arrangements, such as the Global Environment Facility, activities implemented jointly under the Convention, and the Clean Development Mechanism under the Kyoto Protocol, resulting from the international climate change negotiations. Detailed objectives and actions for the above policy elements are included in Section 6.

Climate Change and Energy Department in the Ministry of Housing and Environment is the designated national authority of Maldives. Maldives is part of one of the multiple countries Programmatic CDM project under validation. The project aims to replace existing and predominant use of kerosene-based lighting with purpose designed LED/CFL lamps in the household.

3. Sustainable Development and Mitigation

- **National inventory of greenhouse gas**

The Maldives inventory of GHG emissions has been calculated for year 1994 and is limited to the best information available for that year. It was not possible to report on emissions of all three major GHGs; carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). The inventory was developed mainly for the energy sector using the IPCC Reference Approach.

In the Maldives, diesel is the main fuel consumed and is used to generate electricity and for transportation. It was estimated that 129 Gg of carbon dioxide was emitted from the energy sector (0.54 tonnes of CO2 per capita) and 1.1 Gg of methane was emitted from the waste sector.

The table shows the amount and the type of fuels consumed within the Maldives and respective emission of CO2 from each fuel type.

Table 1: CO2 Emissions by Fuel Type

Fuel Type	**Fuel consumed within Maldives (Mt)**	**Emission of CO_2 (Gg)**
Gasoline	3.127	10.182
Jet Kerosene	3.541	11.175
Other Kerosene	0.013	0.043
Gas/Diesel	65.556	103.465
LPG	1.107	3.033
Bitumen	0.006	0.009
Lubricants	0.719	1.048
Total	115.246	128.995

Developing the GHG inventory highlighted the need for training in collecting relevant statistical data and modifying the IPCC guidelines to capture the small scale of GHG emissions from the Maldives.

Land use, land use changes and forestry and the existence of natural and managed GHG sinks, were not accounted for in the GHG inventory due to lack of sufficient data.

- **Summary of Nationally Appropriate Mitigation Action (NAMA) plan**

Maldives submitted their NAMA on 29 January 2010 with the goal of achieving carbon neutrality as a country by 2020. The Government stated that it was undertaking detailed work on implementation of this action and that it would register a request for technological, financial and capacity building support for implementation. However, it also stated that the submission of the mitigation action was voluntary and unconditional.

- **Mitigation Options**

Maldives is a non-annex I party to the UNFCCC and is not obliged to implement GHG mitigation measures. However, mitigation measures have been developed not only to reduce the Maldives emission of GHGs, but as a step towards achieving greater energy independence for sustainable development.

The mitigation of GHG emissions is possible by lowering the demand on the imported fossil fuel. This can be achieved by increasing the efficiency in generating and utilising electricity and improving the efficiency of the transportation mechanisms.

Reducing methane (CH4), the main source of emission of GHGs from landfills and sewage discharges, is another possibility. This can be achieved through improving the solid waste disposal methods, management practices and providing treatment of sewage discharges.

The enhancement of the Maldives natural GHG sinks by increasing the vegetation cover and improving the health of the coral reef have been considered as possible mitigation options.

4. Adaptation and Vulnerability

- **Vulnerability to climate change**

Even though the Maldives contributes less than 0.01% to global emissions of GHGs, the Maldives is in fact one of the most vulnerable countries to climate change and sea level rise. The National Vulnerability & Adaptation (V&A) assessment team identified seven main areas of vulnerability:

<u>Land loss and beach erosion</u>

Over 80% of the land area in the Maldives is less than 1 m above mean sea level. Being so low-lying, the islands of the Maldives are very vulnerable to inundation and beach erosion. Presently, 50% of all inhabited islands and 45% of tourist resorts face varying degrees of beach erosion. Climate change and projected sea level rise would aggravate the present problem of beach erosion. It is expected that even a 1 m rise in sea level would cause the loss of the entire land area of Maldives.

Infrastructure damage

All the human settlement, industry and vital infrastructure in the Maldives lie very close to the shoreline. Therefore, the projected rise in sea level poses a grave threat to the existence of these structures. According to research, Malé International Airport on Hulhulé island needs to be given priority, as this is the only gateway to the Maldives. The height of the runway is only 1.2 m above mean sea level and is extremely vulnerable to climate change related sea level rise. Other important vulnerable structures include the investments on tourist islands.

Damage to coral reefs

The low-lying islands of the Maldives are surrounded by coral reefs. These coral reefs not only provide protection for the islands, but are related to success of the main economic activities: tourism and fisheries.

Studies show that the corals are very sensitive to changes in sea surface temperature. Unusually high sea surface temperatures in 1998 caused mass bleaching on coral reefs in the central regions of the Maldives.

If the observed global temperature trend continues, there would be a threat to the survival of the coral reefs in the Maldives.

Impacts on the economy

The threats posed by climate change to the beaches, reefs and infrastructure on resort islands makes the tourism industry very vulnerable to climate change. This greatly affects the economy as tourism contributes to about a third of the GDP of the country.

Fisheries in the Maldives is another economic activity which relies on the health of the reefs. Although no conclusive links have been established between tuna fishery and climate change, it has been found that seasonal monsoon changes do in fact affect the tuna fishery in the Maldives. It has been found that in El Niño years catches of certain types of tuna increase while the others decrease, and the reverse catch pattern is seen with regard to other types of tuna during La Niña periods.

Food security

Due to the poor soil quality in the Maldives, agriculture is a minor industry. The lack of locally grown food items creates a high dependency on imported food, except for tuna and coconut. Therefore the Maldives is vulnerable to changes in productivity of agricultural lands beyond our borders.

The imported food items are first brought to the capital and later distributed to other islands by sea transport. The distribution of food to these islands is very vulnerable to changes in weather. Extreme storm events have led to food running scarce in certain islands. These events have been noted to last for a period of 1-30 days. With climate change and the rise in sea levels, it is expected that more storm events would occur, thereby threatening food security in this island nation.

Water resources

The population of the Maldives mainly depends on groundwater and rainwater as a source of freshwater. Both of these sources of water are vulnerable to changes in the climate and sea level rise.

With the islands of the Maldives being so low-lying, the rise in sea levels would force saltwater intrusion into the freshwater lens. The groundwater is replenished by bursts of rain and although there is a predicted increase in the amount of rainfall to the region, the spatial and temporal change in rainfall pattern is uncertain. Therefore, for the Maldives, climate change poses a threat to water availability.

Human Health

The effects of climate change and sea level rise on the health sector need to be studied further. Notable relations to changes in climate have been seen for dengue and dengue hemorrhagic fever in the country. Although malaria has been eradicated from the Maldives, with climate change there might be a threat of malaria outbreaks occurring in the country. The poor sanitation in the islands of the Maldives, combined with any future increase in rainfall, would cause more outbreaks of waterborne diseases, such as diarrhoea.

Access to health services and facilities during severe weather is a major concern for rural island communities of the Maldives. Other major concerns from climate change are poor human health due to heat stresses, and poor urban air quality. Based on the IPCC regional climate change scenarios, it is estimated that air temperatures in the region may rise by 2 - 3.8 °C by the year 2100.

- **Summary of National Adaptation Programme of Action (NAPA)**

The Maldives' NAPA was submitted to the UNFCCC in March 2008. The adaptation needs presented were identified through wide stakeholder consultations.

Land, Beach and Human Settlements

- Consolidate population and development.
- Acquire support for the speedy and efficient implementation of Safer Island Strategy.
- Strengthen land-use planning as a tool for protection of human settlements.
- Build capacity for coastal protection, coastal zone management and flood control.
- Protect beaches through soft and hard-engineering solutions.
- Protect house reef to maintain natural defence of islands.
- Improve building designs and regulations to increase resilience.
- Integrate climate change adaptation into national disaster management framework.

Critical Infrastructure

- Develop coastal protection for airports and development focus islands.
- Strengthen capacity for planning and design of infrastructure to ensure development of resilient infrastructure.

- Protect powerhouses and utilities.
- Protect telecommunication infrastructure.

Tourism

- Protect beaches and tourist infrastructure.
- Develop climate change adaptation policy and strategy for tourism.
- Diversify the tourism product to reduce over-dependency on marine environment.
- Strengthen tourism institutions to coordinate climate response in the tourism sector.
- Incorporate climate change adaptation measures to upcoming resorts.

Fisheries

- Improve fish finding and fish harvesting.
- Establish aquaculture/mariculture as an alternative to natural breeding to reduce the economic and social impacts of changing tuna abundance.
- Undertake research and disseminate information on fisheries and climate change.
- Experiment new and alternative species and breeding methods for livebait.
- Integrated reef fishery management.
- Exploit new species and promote poultry farming as alternative sources of protein to reduce overdependency on tuna for protein.

Human Health

- Strengthen regulatory and institutional capacity for vector control.
- Streamline the planning of healthcare services and strengthen medical emergency response.
- Promote healthy lifestyles, healthy islands and healthy buildings.
- Strengthen the capacity for healthcare delivery.
- Undertake research and disseminate information on climate change related diseases.
- Increase nutrition promotion campaigns.

Water Resources

- Acquire appropriate sewage treatment and disposal technologies to protect water resources.
- Increase safe rainwater harvesting.
- Acquire desalination technologies appropriate for small islands.
- Undertake recharging of aquifers to reduce salinisation from saltwater intrusion and storm surge flooding.
- Protect and preserve natural water catchment areas.

Agriculture and Food Security

- Develop a national food security strategy.
- Secure trade agreements with foreign trade partners to ensure food security.
- Establish capacity for emergency food storage in development focus islands at regional level.
- Introduce new technologies to increase local food production.
- Strengthen marketing and sale of local food items.

- Improve allocation of land for agriculture.
- Promote traditional food preservation and storage practices for local food.
- Enforce and strengthen quarantine and integrated pest control to prevent pests and diseases.
- Introduce new irrigation technologies.

Coral Reef Biodiversity

- Provide alternatives to coral and sand as construction materials and enforce the ban on coral mining.
- Enhance the capacity for waste management to prevent pollution of marine environment.
- Formulate and implement an oil pollution contingency plan.
- Acquire appropriate sewage treatment technologies.
- Establish marine protected areas.
- Establish an information base on coral reefs and climate change.
- Undertake monitoring and research to prevent coral diseases and rehabilitate coral reefs.
- Develop measures to protect coral reefs from development activities.

- **Adaptation Options**

Adaptation options in low-lying islands of the Maldives, which have been identified as especially vulnerable, are limited and response measures to climate change or its adverse impacts are potentially very costly. Adaptation covers two main types of activities. The first being actual physical adaptive measures targeted at the sectors identified in the “Vulnerability to climate change” chapter above. High importance is given to protecting the islands by building appropriate structures for coastal protection. Several other projects have also been identified for the various sectors.

The second activity is to enhance the capacity to adapt in the Maldives. The Maldives lacks the capacity both technically, and financially to undertake actual adaptive measures. The main areas identified are human resource development, institutional strengthening, research and systematic observation and public awareness and education.

5. Key industries and economic activities

Tourism, Maldives' largest economic activity, accounts for 28% of GDP and more than 60% of foreign exchange receipts. Over 90% of government tax revenue comes from import duties and tourism-related taxes. Fishing is the second leading sector, but the fish catch has dropped sharply in recent years. Agriculture and manufacturing continue to play a lesser role in the economy, constrained by the limited availability of cultivable land and the shortage of domestic labour. Most staple foods must be imported.

In the last decade, real GDP growth averaged around 6% per year except for 2005, when GDP declined following the Indian Ocean tsunami, and in 2009, when GDP shrank by nearly 5% as tourist arrivals declined and capital flows plunged in the wake of the global financial crisis. Falling tourist arrivals and fish exports, combined with high government spending on social needs, subsidies, and civil servant salaries contributed to a balance of payments crisis, which was eased with a December 2009, $79.3 million IMF standby agreement. However, after the first two disbursements, the IMF withheld subsequent disbursements due to concerns over Maldives' growing budget deficit. Maldives has had chronic budget deficits in recent years and the government's plans to cut expenditures have not progressed well.

A new Goods and Services Tax on Tourism (GST) was introduced in January 2011 and a new Business Profit Tax is to be introduced during 2012. These taxes are expected to increase government revenue by about 25%. The government has privatized the main airport and is partially privatizing the energy sector. Tourism will remain the engine of the economy. The Government of the Maldives has aggressively promoted building new island resorts. Due to increasing tourist arrivals, GDP growth climbed to 8% in 2010 and around 6% in 2011. Diversifying the economy beyond tourism and fishing, reforming public finance, and increasing employment opportunities are major challenges facing the government. Over the longer term Maldivian authorities worry about the impact of erosion and possible global warming on their low-lying country; 80% of the area is 1 meter or less above sea level.

6. National development strategy

A National Implementation Strategy was developed to accommodate the main policy elements below into their national planning. Through such policies, the Maldives should aim to benefit from the arrangements, such as the Global Environment Facility, activities implemented jointly under the Convention, and the Clean Development Mechanism under the Kyoto Protocol, resulting from the international climate change negotiations. The main policy elements can be identified as follows:

(1) Participate in international advocacy;
(2) Reflect climate change concerns in regulatory processes;
(3) Create sustainable financing mechanisms for programmes related to climate change activities;
(4) Build, strengthen and enhance national capacity to adapt to climate change;
(5) Incorporate adaptive measures to climate change into national development planning; and
(6) Develop appropriate measures to mitigate greenhouse gas emissions

References

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This summary was prepared based on the data/information publicly available as of June 2012.

3. 政策対話

3.1. 政策対話の開催

2012 年 7 月 10 日から 2 日間、都内で「島嶼国向け気候変動政策対話」と題した国際会議を開催、アジア、大洋州、カリブ地域の 21 ヵ国の気候変動交渉官及び日本政府関係者が一堂に会し、気候変動対策について議論を交わす場を設けた。

本政策対話は、2011 年末に南アフリカ・ダーバンで開催された「国連気候変動枠組条約第 17 回締約国会議（COP17）」で日本政府が発表した「世界低炭素成長ビジョン」に基づき、気候変動と低炭素成長について幅広く意見を交換するために実施された。

日本政府は、6 月にブラジル・リオデジャネイロで開催された「リオ＋20」で発表した「緑の未来」イニシアティブによる支援に加えて、さらなる支援を積極的に検討していることを示した。

3.2. 政策対話のアジェンダ及び参加者リスト

添付 1 及び 2 参照。

3.3. 政策対話の議事録

「島嶼国向け気候変動政策対話」の各セッションにおける主な議事を次章にとりまとめる。尚、本政策対話の成果を広く知らしめるための広報資料（添付 3）を作成し、COP18 における日本政府のサイドイベントにおいて配布した。

3.3.1.セッション 1

セッション名	セッション 1:　島サミットをはじめとする島嶼国向け支援
議事進行	南　博　外務省国際協力局参事官　※議長
発表者	不破　雅実　独立行政法人国際協力機構地球環境部部長 榎本　宏　独立行政法人国際協力機構地球環境部気候変動対策室室長
参加者	島嶼国 21 ヵ国の気候変動交渉官・在京大使館関係者
発表内容	
・　南参事官より、開会に先立つ挨拶が行われた。 ・　不破部長より、スピーチ ・　榎本室長より、島嶼国における気候変動に対応した開発に対する JICA の役割について発表 ・　榎本室長より、低炭素かつ気候変動に適応可能な開発に関する JICA の方針について発表	

発表資料：
添付 4　Speech by Mr. Masami FUWA, Director General, Global Environment Department, JICA（JICA　不破部長）
添付 5　JICA Assistance for Climate Compatible Development in Small Island Developing States (SIDS)（JICA　榎本室長）
添付 6　Direction of Low Carbon and Resilient Development Cooperation by JICA（JICA 榎本室長）

質疑応答

1.　フィジー
- JICA は気候変動に起因する食糧安全保障の問題に関する支援を行っているのか。

⇒　榎本室長の応答
- プレゼンテーションで言及しなかったが、JICA は農業に関するプロジェクトも多く行っている。特に米生産などをアフリカで、また東ティモールでも行っている。太平洋とカリブ諸国では漁業に関するプロジェクトも行っており、JICA の食糧安全保障に関するプロジェクトは世界中に及ぶ。

⇒　不破部長の応答
- 漁業の支援など、海洋の環境保全に努めている。

⇒　榎本室長の応答
- JICA は沿岸管理プロジェクトの支援も行っている。

⇒　フィジーの質問
- 大きな枠組みでの支援ではなく、コミュニティレベルの支援を行っているのか聞きたい。

⇒　榎本室長の応答
- その件の詳細については今後議論していきたい。

2.　パプア・ニューギニア
- JICA を通じて日本政府からこれまで多大なサポートを受けていることに感謝する。
- 今後は持続的な資金メカニズムや開発戦略の支援を期待する。

⇒　榎本室長の応答
- 新規事業の提案については JICA のパプア・ニューギニア事務所にコンタクトを取ってほしい。

3.　ベリーズ
- JICA は潮力発電や海洋温度差発電の事業支援は行っていないのか？

⇒　榎本室長の応答
- そのことについては、後ほど別途回答したい。

4. ツバル

- 第 6 回太平洋・島サミット（PALM6）で野田総理は今後 3 年間で 5 億ドルの支援を行うため努力する旨の発言をしたが、引き続き気候変動対策の支援を行うかは具体的に言及しなかった。太平洋諸国への支援割当について決定したのか？
- JICA は多くの島嶼国への支援を行っているが、ツバルに対して未だ実施していないようである。今後実施する予定はあるのか？

⇒ 南参事官の応答

- 短期資金支援（Fast-Start Financing）は今年が最後の年となる。2013 年以降の支援については現在議論中である。PALM6 における気候変動分野での PIF を通じた支援については、担当者に確認し後ほど回答したい。

⇒ 榎本室長の応答

- ツバルは気候に対して最も脆弱な国であることは認識している。現在は大学・研究機関を通じて沿岸管理プロジェクトをツバルで行っている。

5. ジャマイカ

- 資金メカニズムを利用する方法について詳細を知りたい。

⇒ 榎本室長の応答

- CDM に関して言えば、ザンビアやブータンでの地方電化の CDM 案件は JICA の支援により成立した。

⇒ ジャマイカの質問

- どのような手順を踏めばよいのか等、具体的な手段を知りたい。

⇒ 榎本室長の応答

- 在ジャマイカの日本大使館、もしくは JICA の現地事務所に連絡を取ってほしい。

6. ガイアナ

- REDD＋について詳細を聞きたい。JICA は REDD＋に関してどのようなサポートを行っているのか。

⇒ 榎本室長の応答

- REDD＋については、MRV、地域密着型林業、天然資源管理といった事項が対象範囲である。

7. バルバドス

- バルバドスは「全ての人のための持続可能なエネルギー」を宣言した。
- 持続可能なエネルギーには、エネルギーへのアクセス、再生可能エネルギー、エネルギー効率向上が含まれ、自主的な数値目標を掲げている。
- オーストラリア、ニュージーランド、イギリス、ノルウェー、デンマークはわが国の宣言履行を支援することを表明した。

- 日本もバルバドスの優先事項への支援を行うことを望む。

⇒ 南参事官の応答
- 日本はバルバドスの取り組みへの支援について真剣に検討する。

⇒ 不破部長の応答
- 住宅用太陽光発電システムはキリバスで成功している。そのようなシステムを他の国にも紹介していきたい。

8. セントルシア
- 気候変動緩和策について早急かつ具体的な成果が生み出されることを望む。
- コジェネレーションやソーラークーリングシステムといった技術を導入していきたい。特にソーラークーリングシステムは既に日本企業による実績がある。
- 資金的支援を受けるための手順はとても重要であり、詳細な説明を求める。
- 適応策については、漁業や沿岸地区支援が重要である。
- 水分野は重要だが、プレゼンテーションでは触れられていなかった。日本ではどのような位置づけなのか？

⇒ 榎本室長の応答
- 水分野は適応策の中でも重要だと認識している。アフリカや中東で多くのプロジェクトを推進しており、今後も同プログラムを強化していきたい。

⇒ 不破部長の応答
- 水資源の効率的な利用は重要である。無駄な利用を阻止する技術を応用すれば、水資源の効率利用につながる。

3.3.2.「中野政務官と島嶼国との対話」

議事進行	中野　譲　外務大臣政務官 南　博　外務省国際協力局参事官　※議長
参加者	島嶼国 21 ヵ国の気候変動交渉官・在京大使館関係者
発表内容	

1. 中野政務官からの発言
- 本政策対話は、昨年の COP17 の際に日本政府が発表した「世界低炭素成長ビジョン」に基づき、気候変動及び低炭素成長に関して、COP18 に向けて幅広い意見交換を行うために実施するものである、これまで議論がされてきた事案を進展させる良い機会と考えている。
- 日本政府は気候変動の将来の枠組み構築に向けた国際的議論に積極的に貢献するとともに、島嶼国を含む気候変動における脆弱国への支援を実施している。

2. キリバスからの発言
- 本政策対話への参加機会を用意した日本政府に謝意を示すとともに、これまで日本政府が SIDS に対して提供した支援に感謝する。

- COP17 では、緑の気候基金（GCF）や気候技術センター・ネットワーク（CTCN）の設立といった資金面での重要な進展があったが、これらに関してはさらなる検討が必要である。
- 短期資金支援が本年度末に終わることを受け、2012 年以降も引き続き SIDS と日本が共に活動していけるのか、危惧している。
- 京都議定書の第二約束期間における削減量をコミットしていない国は市場メカニズムへの参加を付与されるべきはないと考える。

3. グレナダからの発言
- SIDS の相互関係において、日本の支援は重要な役割を果たしており、世界規模の金融危機の最中において、日本政府が実施してきた支援を評価する。
- 財務省の石井菜穂子副財務官が地球環境ファシリティ（GEF）次期 CEO に選出されたことについてお祝いの言葉を述べたい。
- PALM6 において野田総理が小島嶼開発途上国における持続可能なエネルギー・イニシアティブ（SIDS-DOCK）へのコミットメントを表明したことについて、歓迎したい。
- JICA とは将来一緒に取り組むことを期待している。JICA がさらに多くの仕組みを組成していくことを期待している。
- 日本政府にただ要求していくだけでなく、SIDS 諸国において良い統治（good governance）が可能であることを示していきたい。日本政府とは良好なパートナーでありたい。

⇒　中野政務官の応答
- グリーン経済と気候変動対策について引き続き発言していきたい。
- SIDS 諸国の直面する環境リスクについて、日々の感情から共有を図る必要がある。
- 日本は①資金、②技術移転、③人材支援によって、パートナーシップを構築していきたい。

4. ツバルからの発言
- PIF を通じた支援の現状について

⇒　南参次官の応答
- PALM6 の担当者に確認したところ、PALM6 で議論があったとのことだが、未実行部分も多くファンドの補充については結論が出ていないとのこと。

3.3.3.セッション 2

セッション名	セッション 2: APN が島嶼国の気候変動国際協力に果たす役割について、APAN と太平洋地域の関わりについて
議事進行	南　博　外務省国際協力局参事官 新田　晃　環境省地球環境局国際地球温暖化対策室長　※議長
発表者	竹本　明生　アジア太平洋地球変動研究ネットワーク事務局長 岡安　早菜　公益財団法人地球環境戦略研究機関特任研究員

参加者	島嶼国 21 ヵ国の気候変動交渉官・在京大使館関係者

発表内容

・　新田室長より、冒頭挨拶。
・　APN 竹本事務局長より、島嶼国の気候変動対策に係る国際協力における APN の役割について発表
・　IGES 岡安特任研究員より、アジア太平洋地域適応ネットワークの太平洋島嶼国への関わり合いについて発表

発表資料：
添付 7　Role of APN for Climate Change Policy（APN 竹本事務局長）
添付 8　Asia Pacific Adaptation Network (APAN) and its implications to Pacific Island nations（IGES 岡安特任研究員）

質疑応答

1. グレナダ
- それぞれの事業の効果について検証を行っているのか。

⇒　竹本事務局長の応答
- APN の“Climate Synthesis Report”に事業の効果が記載されている。
- ノウハウと技術を対象国の専門家に移転することが重要である。スコーピング・ワークショップの実施等により、キャパシティ・ビルディングの体系化・簡素化を図るべきである。

⇒　岡安特任研究員の応答
- ネットワークに加盟している団体を召集し年次フォーラムを開催、準地域的なセミナーやワークショップの開催。そのときに活動内容や結果を考察している。

2. クック諸島
- テーマ別分野である水分野には、海洋も含まれるのか。

⇒　岡安特任研究員の応答
- ここでは水管理のことを指しており、どちらかというと淡水が対象となる。

3. マーシャル諸島
- APAN では気候変動の影響による損害・被害（Loss and damage）に関する研究は行っているのか。

⇒　岡安特任研究員の応答
- APAN は未だ携わっていないが、提案は歓迎する。

⇒　竹本事務局長の応答
- APN では損害・被害（Loss and damage）に関し、災害リスク管理等の研究や活動を行っている。

4. ドミニカ共和国

- 気候変動に対する適応策として研修のことを挙げていたが、教育についての言及が見当たらない。教育に関してはこのプログラムではどう考えているのか。

⇒ 岡安特任研究員の応答

- 教育は APAN の活動では優先事項ではないが、研修を通して教育の必要性について認識している。

⇒ 竹本事務局長の応答

- 博士号を取得した学生等を対象とした教育を行っている。具体的にはモデリング、研究、提案の作成等。特に若手科学者の育成に力を入れている。また、トレーナーの養成も重要だと考える。

5. グレナダ

- 科学文献の開発は途上国にとって、とても重要である。IPCC のレポートに引用されるような地元の科学者の活動を促進したい。

⇒ 竹本事務局長の応答

- 意見に賛同するが、実現するには難しく長い道のりである。参加するには地域ネットワークを開発することが重要である。APN の活動を強化するためには広く手を組む必要がある。

6. ミクロネシア

- これらの活動に関わるにはどうしたらよいか。

⇒ 竹本事務局長の応答

- APN のホームページにアクセスしてもらうか、竹本事務局長のメールアドレスに直接連絡をしてほしい。

3.3.4.セッション 3

セッション名	セッション 3: マルチの枠組みを通じた島嶼国への気候変動対策支援
発表	今村　英章　財務省国際局開発企画官
参加者	島嶼国 21 ヵ国の気候変動交渉官・在京大使館関係者
発表内容	

・　今村開発企画官より、SIDS-DOCK プログラム、太平洋災害リスクマネジメントと資金活用（Pacific Catastrophe Risk Assessment and Financing Initiative: PCRAFI）、緑の気候基金（GCF）について発表

・　石井菜穂子副財務官の GEF 次期 CEO 選出に際し、早期からの SIDS のサポートへの謝意。

・　SIDS-DOCK プログラムは、SIDS の低炭素経済への移行をサポートするもの。このプログラムは各々の国の事情に沿って実施されることが重要である。

・　PCRAFI は、災害リスク管理の強化と太平洋島嶼国の自然災害に対する資金的脆弱さ

を軽減することを目的とした共同イニシアティブであり、災害に対して迅速な資金拠出が可能である。2012 年 11 月より 2 年間の試験的なプログラムが始まる。
・　GCF は、低炭素かつ気候変動に適応可能な開発の道筋に関し、パラダイム変化を促進する。この基金は、特に気候変動の影響に対して脆弱な国々のために重要な役割を果たす。

発表資料：
添付 9　Japan's Assistance for the SIDS to combat climate change through multilateral Partnership　（今村開発企画官）

3.3.5.セッション 4

セッション名	セッション 4: 気候変動における日本の低炭素技術の役割
発表者	信谷 和重　経済産業省地球環境対策室室長
参加者	島嶼国 21 ヵ国の気候変動交渉官・在京大使館関係者

発表内容

・　信谷室長より、気候変動問題解決のための日本技術の可能性について発表
・　二国間オフセット・クレジット制度（Bilateral Offset Credit Mechanism: BOCM）についての説明、プロジェクトの紹介
・　事例の紹介：モルディブの海洋深層水多段利用システムの実現可能性調査

発表資料：
添付 10　Potential of Japan's Technology to solve Climate Change Issues（信谷室長）

コメント・質疑応答

1.　マーシャル諸島
マーシャル諸島は海洋温度差発電を検討している。海洋深層水利用は海洋温度差発電と関連はあるのか？

⇒　信谷室長の応答
海洋深層水利用は海洋温度差発電の一種である。海洋深層水利用では、深海から水を表面まで汲み上げ、冷たい海水を空調に利用する。このようなプロジェクトは FS の対象となる。

2.　グレナダ
METI で行っているものは全てパイロットプロジェクトなのか、実施段階へ移行したプロジェクトはあるのか？

⇒　信谷室長の応答
現時点では実施段階のプロジェクトはないが、来年には BOCM を活用したプロジェクトが実施段階に入ると見込んでいる。

⇒　グレナダからの質問

FS にはどのくらいの期間が必要なのか。来年プロジェクトを稼動させるには既存の FS から選ぶのか、それとも新たに FS をしなければならないのか？

⇒　信谷室長の応答
対象プロジェクトについては既存の FS 案件も含めて二国間政府の間で決定されることになる。このような観点から、まずは FS を実施する必要がある。FS は、民間企業の提案によるものであり、全ての国が対象である。提案する企業は日本企業である必要はないが、日本に事務所があることが必要。
必要な期間については、プロジェクトにより異なる。ある案件は 2010 年から始まって来年稼動する。この例で言うと 2 年掛かるが、これより短い期間にすることもできる。プロジェクトの交渉状況による。

⇒　グレナダからの質問
モルディブの海洋深層水利用プロジェクトの FS の結果を教えてもらうことはできるか？

⇒　信谷室長の応答
このプロジェクトについてはモルディブ政府とは未だ議論を始めていない。FS の結果を基に議論を開始できるようにしたい。

3. ナウル
バルバドスの持続可能なエネルギー宣言のような政策はどのように検討されるのか？

⇒　信谷室長の応答
外務省等との議論を通じて検討したい。

4. トリニダード・トバゴ
- BOCM は日本の国際的な削減目標を達成するために使われるのか、あるいは国内目標達成のためか？
- BOCM クレジットの価格はいくらか？
- BOCM のクレジットは CER と取引はできないのか？

⇒　信谷室長の応答
日本政府は温室効果ガス削減の中期目標について再考察しており、今夏その結果を発表する予定である。BOCM のクレジットは国内目標である中期目標の一部として利用される予定であり、また国際目標の一部として利用したい。
BOCM のクレジットの価格は現時点では言及できないが、様々な要因で決定されるもの。BOCM はオフセット型で開始したいと考えており、その間、移転可能なクレジットは発行されない。しかし、将来的にはクレジットが発行される制度にしたい。

5. セントルシア
資料の 8 ページに掲載されているような全ての FS プロジェクトは、BOCM になるということなのか？

⇒　信谷室長の応答
ここに載っている FS は、政府間交渉のベースとなるものである。この中から BOCM となるプロジェクトを選ぶか、もしくは新たに発掘してもよい。

⇒　セントルシアの質問
FS には今も応募できるのか？

⇒　信谷室長の応答
正確なタイムスケジュールは分からないが、予算が未だあれば可能である。通常は春季に公募開始のアナウンスを行う。

6. サモア
日本政府は BOCM において SIDS に対する特別な支援を行うのか。また、FS の後も日本政府は援助をしてくれるのか。

⇒　信谷室長の応答
- BOCM に直接関係するものはないが、様々な財政的支援策がある。
- BOCM に関心がある場合は、各国の日本大使館に連絡してほしい。

7. モルディブ（コメント）
紹介のあった FS は、地元の企業のコンセプトに対し、日立プラントテクノロジー社が提案を行ったものである。
BOCM の FS のような調査をするには最善な時期だと考える。

3.3.6.セッション 6

セッション名	セッション 6: Open Discussion ～　国際交渉における日・AOSIS 協力の方向性について
議事進行	外務省
参加者	加納　雄大　外務省国際協力局気候変動課長 川村　真紀　外務省国際協力局気候変動課課長補佐 新田　晃　環境省地球環境局国際地球温暖化対策室長 榎本　宏　独立行政法人国際協力機構地球環境部気候変動対策室長 松波　克次　アジア開発銀行駐日代表事務所　駐日代表 山下　加夏　コンサベーション・インターナショナル・ジャパン（CI）副代表　兼　気候変動プログラムディレクター 藤野　基文　毎日新聞　記者 比嘉　洋　毎日新聞　記者 吉高　まり　三菱 UFJ モルガン・スタンレー証券　主任研究員 本郷　尚　三井物産戦略研究所　研究フェロー 亀山　康子　環境研究所　社会環境システム研究センター持続可能社会システム研究室　室長

	山岸　尚　　公益財団法人世界自然保護基金ジャパン（WWF） 気候変動エネルギー・グループ　リーダー 井上　陽子　読売新聞　記者 島嶼国 21 ヵ国の気候変動交渉官・在京大使館関係者

発表内容・ディスカッション要旨

・　外務省　加納課長によるディスカッション・トピックの紹介

SIDS 支援における官民の協同の可能性、また様々な国で多種多様な重要課題がある中で、気候変動の認知度をどのように高めていくかということを念頭に、以下 5 点のトピックを例示した上で活発で自由な意見交換を呼びかけた。

- SIDS 支援において考慮すべき特定事項は何か？
- SIDS における技術開発・技術移転及びキャパシティ・ビルディングに対し、日本はどのように貢献できるか？
- SIDS 支援おいて官民の協力をどのように促進できるか？
- 南・南協力の期待される役割は何か？
- UNFCCC 下の気候変動交渉において、日本と SIDS はどのように協力できるか？
- 多国間開発銀行（MDB）、NGO、シンクタンク、メディア等の様々なステークホルダーの期待される役割は何か？各ステークホルダー間の協力関係及びネットワーキングをそのように促進できるか？

・　日本のステークホルダーによるコメント

1.　アジア開発銀行（ADB）　松波氏

- SIDS が面する挑戦は、適応と災害への対応力のネクサス(nexus)と認識する。
- この課題に対応するには、1）気候変動に強靭な(climate resilient)インフラ整備、2）気候リスク資金、3）気候変動への適応（CCA）と災害リスク削減（DRR）の主流化が必要であり、これらを実現するにはインセンティブ、投資、組織的キャパシティが重要となる。
- CCA と DRR は雇用促進や経済発展に直結しないため、投資を呼び込みにくい。そこで、「グリーン成長」や「低炭素成長」といったポジティブな概念を導入することにより、CCA 及び DRR への投資にインセンティブを与えることができる。
- 投資は ADB の役割である。
- キャパシティ・ビルディングは長期間にわたり、信頼関係を築いた上で実施するのが最も効果的と考える。
- 日本政府へは、1）スマートで、グリーンな、耐気候型の技術開発・移転、2）効果的なキャパシティ・ビルディングでの協力を要望する。

2.　三井物産研究所　本郷氏

- 民間セクターの立場から、技術と技術普及について発言する。
- 例として、海洋深層水の利用による省エネと淡水化技術を紹介する。当該技術は、エネルギーと水を同時に生産する日立プラントテクノロジー社の画期的な技術であり、開発と F/S に経済産業省の支援を得ている。
- このような技術の普及或いは障壁の排除には、1）初期コストの削減（政府の補助金による価格支援または企業が価格を下げることにより他社も追随するような市場に

よる価格の低下が考えられる)、2）システムの標準化 （仕様、小規模な企業或いは国による共同購入)、3）SIDS のそれぞれの国は小規模だが、共同体をつくることにより、より大きな市場、より大きな信用力を作ることができ、民間からより多くの投資を呼び込める。

3. 国立環境研究所、亀山氏

- 京都議定書が合意された頃と比べて、開発途上国の立場が多様化し、一部では GHG 排出量が急増している中、国連は引き続き多国間合意の中心である。その国連の意志決定プロセスは、規模に関わらず１国に１投票権が与えられているため、SIDS にとって有利なものであり、SIDS はその利点を最大限に活かし、気候変動リスクを主張すべきである。
- 将来枠組みの構築には、MRV が重要であり、GHG 排出削減量の計測等でも日本と SIDS の協力が期待できる。

4. コンサベーションインターナショナル（CI） 山下氏

- NGO の役割は、政府や民間でカバーできない部分を埋めることであり、進展が遅い国際交渉に先取りし、草の根レベルの支援を提供することである。
- CI は SIDS で低炭素開発計画の策定を支援した経験がある。
- SIDS における重要な要素は、コミュニティによる意志決定プロセスへの参加、キャパシティ・ビルディング、REDD＋等である。
- COP18 では、野心的な目標設定を期待する。日本政府には SIDS への更なる支援の提供、SIDS には日本との協力を望む。

5. WWF 山岸氏

- WWF は環境保全や動物保護で一般的に有名だが、それらの活動においても気候変動への適応が組み込まれるようになっている。例えば海洋生物の保護においては、気候変動が最大の危険要素であり、気候変動への適応が重要課題である。
- WWF は諸外国に事務所があり、直接住民のニーズを聞き、応えることができる。
- COP18 では、損失と被害についてより大きな重点が置かれるべきであり、何かしらの決議が達成されることを期待する。

・ SIDS からのコメント

1. モルディブ

問題点をいくつか提示したい。国際的 NGO には資金力はあるものの、島嶼国には来ない。一方、地元の NGO は資金力がない。ADB のような国際援助機関は、多くの資金を途上国に提供してくれるが、大部分はコンサルタントや政府機関への賄賂に支払われ、地元の便益にならないことが現実である。

2. フィジー

- 多くの SIDS の経済は公共セクターに依存しており、大きな市場を形成することは難しい。
- 技術のみならず、ノウハウ等も移転してほしい。気候変動への対応力を高めるために、コミュニティの知識向上を図りたい。

3. グレナダ

- 気候変動の危機は人類の存続に直結しており、他の危機よりも深刻であり、その解決に代替案はない。
- 日本との協力関係のより一層の強化を望む。カリブ地域と日本に関しては、協力関係の歴史は比較的日が浅く、拡充の余地があると考える。
- キャパシティ・ビルディングはワークショップで行われるものではなく、関係と信頼によって実現するものであるという視点に同意する。金融機関に属する人がそのような視点を持っていることは喜ばしい。
- 技術については、移転ではなく開発を重視したい。技術の所有または共同開発を通じた当該国のエンパワーメントが、技術レベルの向上を更に促進すると考える。
- SIDS の悲惨な事実のみならず、良いアイデアを文書化して、一般に広めることが重要であり、その点でメディアの役割は大きい。資金の呼び込みにもつながると考える。
- 全てのレベルにおける日本と SIDS の協力関係の強化及び加速化に大きなポテンシャルが見いだせる。

4. 三井物産 本郷氏

技術とシステムは似ているようで異なる。技術は商品であり、技術移転にはつながらない。システムは導入から運転を含むものであり、技術移転につながる。日本企業の関心は、地元のパートナーを必要とするシステムの導入である。

5. ADB 松波氏

- 変化には政策、組織、及びインセンティブが必要である。政策とインセンティブはホスト国が用意をしなくてはならない。組織的キャパシティは地元の NGO の支援により可能であろう。地元の NGO には大きなポテンシャルがあると考える。
- 技術はホスト国によりそれぞれのニーズに合うように適応される必要がある。真のパートナーシップは双方向のものである。

6. CI 山下氏

MDB、フランス及び日本政府、CI が資金提供している “Critical ecosystem partnership fund”という基金の下、地元 NGO を支援している。

7. セントルシア

研究開発における協力は十分ではなく、改善の余地がある。例えばセントルシアには国立大学がなく、キャパシティは非常に限られている。

8. 三菱 UFJ モルガン・スタンレー証券 吉高

- CDM プロジェクトの開発に 10 年以上に渡り携わってきた経験から、LDC における CDM は非常に難しく、実現までに長期間を要し、機能しないことが多いことが明らかである。新しい CER バイヤーもいない現状の中、新たなメカニズムが必要である。
- 本政策対話の事務局として、SIDS に対する JICA の支援に関する意見を聞きたい。

9. クック諸島

- 政府関係者ではなく、NGO の代表として意見する。
- CI 等の支援はプロジェクト限定であることが多く、柔軟性がないため問題が生じる

ことがある。
- 開発は環境を犠牲にしては成り立たず、チェックとバランスが重要である。

10. マーシャル諸島
マーシャル諸島政府は CCA と DRR に関する “Joint National Action Plan”を策定した。政策を実行に移すため、資金援助を求めている。

11. ナウル
SIDS にとって海洋は生活全てにおいて重要であり、重視する必要がある。

12. パプア・ニューギニア
ADB のような援助機関の提案プロセスを簡素化してほしい。条件が多く、手続きが煩雑である。

13. ミクロネシア
深海で CCS プロジェクトを実施した場合、どのように漏洩を防ぐのか？

14. 本郷氏（13.ミクロネシアのコメントへの回答）
- 専門家ではないが、深海での CCS 技術の導入はかなり先の話と感じている。
- 海洋には潮力発電のポテンシャルもあるが、技術開発には時間がかかる。

15. 亀山氏（7.セントルシアのコメントへの回答）
学術分野の協力の重要性に同意する。日本の大学は少子化で生徒不足に悩んでおり、外国からの留学生を歓迎しているので、留学生の受け入れを通した技術協力も可能と考える。

16. 読売新聞、井上氏
SIDS はダーバン・プラットフォームの加速化において非常に強い主張を行っており、COP18 に向けた動向においても、大変注目している。

17. ジャマイカ
技術導入において SIDS 側の役割があるのは理解するが、途上国と最新技術の間には未だに大きなギャップがあり、技術の理解度を深め、それぞれの環境への適応においても支援が必要である。

18. グレナダ
- このような日本の様々なステークホルダーとの有意義な対話の機会と場を設け、SIDS を歓迎してくれた日本政府に謝意を表する。
- 日本と SIDS の関係は良好であり、交渉においても日本政府のより深い関与を期待する。民間セクターからはより多くの投資を、NGO からはより多くの関与を期待する。また、メディアにおいては、各国間の関係を強化するような報道を期待する。
- 日本には、引き続き震災からの復興とその成功を祈る。既に日本が示してくれたように、早いアクションと不断の努力は実を結ぶと信じている。

・　**加納課長の閉会の挨拶**

SIDS からの招聘者の来日及び対話への活発な参加に謝意を表し、同時にセッション 6 に参加した日本の民間企業、NGO の関係者にも有意義な意見交換に謝意を表し、本政策対話を終了とする。

写真 1. 参加者と対話する外務省中野政務官（右端）

写真 2.　政策対話の様子

写真 3. JICA の気候変動分野の島嶼国支援を紹介する不破部長（右）と榎本室長（左）

写真 4. 謝辞を述べるグレナダの
ウィリアムズ国連常代表（左から 2 人目）

写真 5. NGO の立場から見解を述べる WWF 山崎氏（中央）

写真 6. 民間企業の立場で見解を述べる三菱 UFJ モルガン・スタンレー証券　吉高（中央）

3.4. 政策対話のフォローアップ

「島嶼国向け気候変動政策対話」においては、参加国から以下に記すようなニーズやコメントが寄せられた。本調査の一環で参加した第 18 回気候変動枠組条約締約国会議において、島嶼国関係者と面談を行い、現状をフォローすると共に、各国における気候変動策や低炭素開発戦略の策定に向けた取り組みの進捗状況や新たなニーズについてヒアリングを試みた。

- パプアニューギニア
  - これまでの日本政府からの支援に加え、今後は、持続的な資金メカニズムや開発戦略の支援を期待する。
- ナウル
  - 京都議定書第二約束期間において、日本を含むより多くの先進国による更なるコミットメントを求める。加盟国が柔軟性メカニズムに参加するには、緩和コミットメントが必要と考える。
  - 気候変動の影響による損害・被害（loss and damage）に関する国際的なメカニズムの設立が喫緊の課題と考える。
  - 短期資金支援（Fast-Start Financing）終了伴い、資金的支援の運用化促進に日本政府の更なる努力を求める。
- ツバル、グレナダ
  - PALM6 にて日本政府が発表した「今後 3 年間で最大 5 億ドルの援助を行うべく最大限努力すること」に関し、太平洋諸島フォーラム（PIF）メンバー国への支援に気候変動分野が含まれるのか、具体的な計画を知りたい。
- バルバドス
  - ダーバンプラットフォームにおける将来枠組みの検討期限は 2015 年であるが、2013 年半ばまでの初期段階の作業について、交渉を強化するためにも、日本が主導となりインフォーマルなワークショップ形式の議論を多く持ち、早期の運営化を目指して欲しい。
- トリニダード・トバゴ
  - 短期的資金（Fast Start Finance）の終了を踏まえ、緑の気候変動基金の運営開始までの資金的ギャップへの対応等、COP18 での実質的な議論を求める。
  - 小島嶼諸国連合（AOSIS）の緩和活動に関する資金的支援について、COP18 の場において明確な意思が示されるべきである。
- セントルシア
  - 損害・被害（loss and damage）について、十分な支援とキャパシティ・ビルディングが提供を望んでおり、ダーバンプラットフォーム作業部会（ADP）の一環として位置付けされるべきである。更なる会議やワークショップを検討して欲しい。
  - NAMA（国別緩和行動）や国際協議及び分析（ICA）のプロセス に関する技術的支援を求める。

フォローアップにおいては、特に、都合により政策対話への出席が適わなかったサモア、フィジー、パラオ、ソロモン諸島、東ティモール、バヌアツ、及びジャマイカの 7 カ国を中心にメールでコンタクトをしたが、面談が実現したのはソロモン諸島一カ国のみであった。

以下に、ソロモン諸島の代表者との面談の要旨を記す。

日　時	2012 年 12 月 3 日（月）12:00～13：10
場　所	Qatar National Convention Center
出席者	- Mr. Douglas Kiu Tien Ming Yee, Director, Climate Change Division, Ministry of Environment and Climate Change - Mr. Barbavas Nellypala Bago, Chief Planning Officer, Economic and Productive Sector, Ministry of Development and Aid Coordination - 三菱 UFJ モルガン・スタンレー証券　縫部　敦子
主な議事	
政策対話の開催について - ソロモン諸島は、島嶼国政策対話（2012 年 7 月）において、Douglas 氏を派遣するはずだったが、業務上の都合により同氏が来日出来なくなり、参加を断念した。面談において、政策対話の概要を簡単に説明したところ、このような地域ごとの政策対話の機会を設けている先進国は他になく、非常に有意義な取り組みであるとのコメントがあった。 ソロモン諸島の状況について - JICA 支援のプロジェクトに 2009 年より実施中の給水プロジェクトがあり、特に青年海外協力隊からの支援に感謝しているとのコメントがあった。 - ソロモン諸島は本年 6 月に気候変動政策[1]を発表し、既存の国家開発計画とのシナジーを持つ気候変動策の推進を目指している。同政策においては、気候変動への対応に必要な方策、気候変動対策を実現させるために必要な環境づくり等を解説しており、全てのステークホルダーが一つになり気候変動への取り組みを推進出来るようなガイダンスとなっているという。 - ソロモン諸島においてもっとも課題となっているのが汚水処理である。現在はほとんどの汚水が未処理のまま海に流されているとのこと。また、病院等からの汚水については一次処理が施される場合もあるが、処理レベルは限定的であるとのこと。JICA の支援を受け、汚水からのメタン回収、バイオガス利用等の CDM 化を期待しているとの話があったが、海に放流されていることにより、ベースライン排出量の同定が難しいと思われる点を説明した。いずれにせよ、汚水処理はソロモン諸島にとり喫緊の課題であることから、支援を受け何とか改善したいと要望があった。また、固形廃棄物に関しては、ADB が調査を行っており、複数地点に廃棄物処理場を建設し、メタンの放出回避プロジェクトを推進することを検討しているという。 - また、電力の受給について未だ十分でなく、地方都市の電化を推進するためにも発電容量の増大を図りたいとのこと。現在の系統電源はほぼ化石燃料ベースであるが、水力資源は多少なりともあるようで、1990 年代に実施された JICA による水力発電事業のマスタープランを再考し、水力発電の開発に力を入れることも望んでいるという	

[1] http://www.sprep.org/attachments/Climate_Change/SI_Climate_Change_Policy.pdf

COP18 への期待について

- Pre COP18 からすでに 2 週間が経過しているが、具体的な進展がみられる様子がないとのこと。また、NAPs の議論は多少進展しているように見えるが、今後一週間以内に COP18 に期待されている重要な決定事項があるとは思えないとのコメントがあった。

早期資金(Fast Start Finance)及び緑の気候基金（GCF）について

- 早期資金においては、実際にソロモン諸島がどのような便益を受けたか、余り認識していない（早期資金以前の資金とはっきり色分けされていないから、わからない)。緑の気候基金においては、そのような問題がないと期待する。適応資金のフロー増大を期待する。

4. 視察プログラム

4.1. 視察プログラムの概要

政策対話終了後、視察プログラムが組まれ、島嶼国からの参加者は、株式会社日立プラントテクノロジー松戸研究所（千葉県松戸市）と東京ミッドタウン（東京都港区）を訪問した。日立プラントテクノロジーでは、海洋深層水を空調用の冷熱源と海水淡水化のための原水の二段階で多目的に利用することで、大幅な省エネルギーを実現する「海洋深層水多段利用システム」などの説明を受けた。同システムは、消費エネルギーを従来に比べて 60 パーセント以上削減することができ、また、既にモルディブで事業化調査が進められている技術でもあり、参加者の高い関心を集めた。さらに、東京ミッドタウンでは、同施設のスマートシティ構想について説明を受けた。

開催日	時間	訪問先
2012 年 7 月 12 日	9:30-10:50	株式会社日立プラントテクノロジー松戸研究所見学
	14:00-16:30	東京ミッドタウン見学

4.2. 視察先における主な説明内容と質疑

4.2.1. 日立プラントテクノロジー松戸研究所見学

先方対応者
株式会社日立プラントテクノロジー松戸研究所 ・ 横山氏（水環境ソリューション統括本部長） ・ 樫田氏（水環境ソリューション統括本部） ・ 吉田氏（松戸研究所副所長） ・ 原田氏（松戸ショールーム館長）
主な説明内容
日立プラントテクノロジーの横山水環境ソリューション統括本部長より歓迎の挨拶を受けた後、同社の概要および同社の水処理と海洋深層水を活用した技術についての DVD を視聴。また、吉田松戸研究所副所長より松戸研究所の概要と水処理技術の説明を受け、同研究所内にあるショールームを見学。 - 日立プラントテクノロジーは日立製作所の 100%子会社であり、日立グループの社会・産業インフラ事業の中核企業である。同社は「社会インフラシステム事業」、「産業システム事業」、「空調システム事業」、及び「エネルギーシステム事業」の 4 つの事業セグメントで構成されている。また、研究・開発を行う機関として千葉の松戸と茨城の土浦の二ヶ所に研究所を開設している。松戸研究所は水環境システム部、空調・プラントシステム部、及び電力システム部で構成されており、ショールームが併設されている。

- 今回は島嶼国で最も関心が高いと思われる水処理について以下の技術を紹介。

①オイル&ガス随伴水処理システム
- 油田・ガス田から原油やガスを採掘する際に注入する水は「随伴水」として排出され、多くの油分が含まれている。法律で定められている環境規制をクリアするためには、随伴水に含まれる油分を除去する必要があり、同社の凝集磁気分離システムを活用することで、高速かつ品質の高い処理水を確保することが可能。
- 設置面積が 24 ㎡とコンパクトなため、洋上の海底油田・ガス田向けプラットフォーム内に設置することが可能であり、処理した水は、再び注入水として利用できる。
- 凝集磁気分離システムにより、殺菌剤を使用せずにバラスト水の浄化を行うことができる「バラスト水浄化システム」装置を開発し、地球環境に配慮したシステムを実用化した。

②膜分離活性汚泥処理システム（MBR）
- 生活排水を収集・処理し、再生水を製造できるシステム。活性汚泥処理と浸漬膜を組み合わせにより高濃度活性汚泥処理が可能となり、維持管理が容易、省スペース・低コストで、高度な処理水質確保を図る小規模下水処理を行うことができる。再生水は主に農業用、緑化用に活用できる。

③逆浸透膜式海水淡水化システム（RO）
- および の処理に加え、更に RO システムを活用することで、高品質の再生水が製造でき、高層ビルの冷房用の補給水やコンクリート練り水に活用することができる。

④海洋深層水多段利用システム
- 海洋深層水を空調用の冷熱源だけでなく、海水淡水化や産業利用の原水等としても有効活用するシステムを開発。
- 熱帯地域に属する島嶼国では、冷房の消費エネルギーの割合が年間を通じて高く、空調システムの省エネルギー化が求められているが、このシステムを活用することにより、従来システムに比べて消費電力を 60%以上削減できる見通し。
- 海洋深層水の「清浄性」という特性を活用し、空調システムの冷熱源として利用した後の水温が上昇した海洋深層水を RO システムの原水として再利用することで、従来システムに比べて造水コストを 20%以上低減できる見通し。
- NEDO 技術開発機構の平成 23 年度「地球温暖化対策技術普及等推進事業」に採択され、モルディブ共和国で事業化調査を実施した技術である。

モルディブの Mr. Mohamed ZAHIR より、日立プラントに対し御礼と感謝の意が述べられ、終了。

質疑応答

- バラスト水浄化システムの撹拌槽が故障した場合はどうするのか。（パプアニューギニア　Ms. Rensie Xhira Bado PANDA）
  →バックアップ設備があるので、それを作動させる。
- モルディブの海洋深層水多段利用システムはいつから稼動するのか。（グレナダ　Ms. Dessima Margaret WILLIAM）

→2014 年 7 月を目標にしている。
- 海洋深層水はどのくらいの深さの水を汲み上げているのか。(グレナダ　Ms. Dessima Margaret WILLIAM)
→約 1,000m の深さの水である。海水の温度は 5 度で安定しており、不純物も少ない。

4.2.2. 東京ミッドタウン見学

先方対応者
イーソリューションズ株式会社 ・ 佐々木氏（代表取締役） ・ 長谷川氏 株式会社日立製作所 ・ 戸辺氏（社会イノベーション・プロジェクト本部　ソリューション推進本部副本部長） ツネイシホールディングス株式会社 ・ 綿谷氏（取締役　新事業開発部担当） 清水建設株式会社 ・ 竹内氏（環境・技術ソリューション本部 主査） 三井不動産株式会社 ・ 関谷氏（柏の葉キャンパスプロジェクト推進部　事業グループ長） 株式会社東芝 ・ 高木氏（社会インフラシステム社　電力流通システム事業部　参事） 東京ミッドタウンマネジメント株式会社 ・ 恒川氏（取締役　プロパティマネジメント部長）
主な説明内容
イーソリューションズ株式会社佐々木社長より、東京ミッドタウンと本日のプレゼン内容の概要について説明。その後以下のプレゼンテーターより各社の取り組みについて説明。 - 株式会社日立製作所　戸辺氏 ➢ 日立製作所が取り組むスマートシティ事業についての概要説明の後、沖縄とハワイにおけるスマートグリッド実証実験について説明。 ➢ 沖縄県では離島型スマートグリッド構想の一環として、2011 年 2 月より民間企業の主導による電気自動車（EV）レンタカーサービスを開始。日立は、このプロジェクトにおいて、EV 用充電インフラの整備事業に参画している。220 台の EV レンタカーに加え、27 基の充電設備が、コンビニエンスストアやサービスエリア、道の駅などに設置された。今後 3 年間で 50 基の充電設備を増設予定。また 2020 年までには 100 基の充電設備と 6 千台の EV レンタカーを普及させる予定。 ➢ ハワイにおける実証は、NEDO 技術開発が実施する「ハワイにおける日米共同世界最先端の離島型スマートグリッド実証事業」として採択されたもので、日立製

作所、みずほコーポレート銀行、及びサイバーディフェンス研究所の 3 社の共同で 2014 年末まで実施する。ハワイ州マウイ島では、2030 年には島内の全体発電量の 40%（現在は 15%）が再生可能エネルギーに置き換わる予定であり、風力発電を中心にバイオマスや太陽光発電、更には EV などの導入が進んでいる。日立は、EV の充電ステーションや家庭の電力機器を、生活者に配慮しつつ直接コントロールする仕掛けを組み込み、再生可能エネルギーを島でなるべく使いながら住みやすい環境をどのように実現するかという実証を進めている。

- ツネイシホールディングス株式会社　綿谷氏
  - 船舶を活用した臨海・防災型のエネルギー供給システムについて説明。
  - 船舶内に LNG 焚き発電機を設置し、EV へ給電を行うシステムを構築することで、津波などの災害でガソリン車が機能しない沿岸部でも、EV による救援が可能となる。
  - また船舶からの発電で充電された EV の電気が家庭に電気を送ることができるため、ライフラインを失った地域の生活は大幅に改善される。
  - エネルギー供給システムに加え、造船技術を駆使した津波避難シェルターの開発も進めている。津波が来ることが予想されるが、高台等に避難する時間がないときには、当該シェルターに避難することで津波に飲み込まれることを防ぐことができる。

- 清水建設株式会社　竹内氏
  - 環境未来都市構想「グリーンフロート」について説明。
  - コンセプト段階だが、2025 年の着工を目指し産官学が連携して推進している。
  - グリーンな技術とフロートな技術の融合により成り立っており、CO2 削減と共に、海に浮かぶという利点を生かし、地震や津波に対して安全な都市を実現することを目的としている。
  - 構造は、赤道直下の太平洋に浮かぶ直径 3ｋｍの円形浮体構造で、高さは 1000ｍであり、700ｍから 1000ｍまでの立体空中都市が主な居住部分と想定。この高さだと、赤道直下でも 26℃と東京の夏の空調されたオフィスよりも涼しく、一年中快適に過ごすことができる。
  - 電力については、将来日本が打ち上げ予定の宇宙太陽光発電のほか、海洋温度差発電も導入する予定。
  - 直径 3km の 1 セルを最小単位とした場合、1 セルに 5 万人が住むことが可能であり、ぶどうの房のようなクラスター状の 1 モジュールとなると、約 10 万人が居住できる。さらに 1 モジュールが 10 集まると、100 万人の都市群を形成することができる。
  - 建物の構造体は、海からとれるマグネシウム合金で造り、浮体構造に超高層を造る技術では、常に地上（一階）で建設作業を行い、できた躯体を海中に落とし、出来上がったものを浮力でもちあげる工法に挑戦している。
  - 資金調達は投資ファンド等が主体となるが、CO2 排出量取引も可能性あり。
  - グリーンフロートは、環境に優しいだけでなく、新産業の育成拠点であることを重視している。つまり海を生かした「新しい海洋産業」、未来の技術を生かした「新しいエネルギー産業」、健康な食品や最先端の医療を実現する「新しいライフサイエンス」を主要産業と考えている。

- 三井不動産株式会社　関谷氏
  - 柏の葉キャンパスシティプロジェクトについて説明。
  - 柏の葉で進められているスマートシティは、単なる環境技術を導入しただけの街ではなく、「環境共生都市」、「健康長寿都市」、「新産業創造都市」の 3 つの解決モデルを目指している。
  - 「創エネ」技術については、太陽光発電に加え太陽熱パネルを設置するとともに、地中エネルギーについてはヒートポンプやクールチューブにより空調の電力削減を図るほか、温泉を採掘して給湯のエネルギー負荷低減にもつなげていく。また、飲食店等から回収した生ゴミを利用して、メタンガスを生成し発電するシステムも導入する。
  - 地域でエネルギーを効率的に使うためには、「創エネ」だけでなく、「蓄エネ」の視点も重要。商業施設の「ららぽーと柏の葉」では、氷蓄熱空調システムや NAS 電池といった蓄エネシステムが稼動している。これらによって割安な夜間電力を蓄えて昼間に使うことで、電気代の削減に寄与することができる。
  - 柏の葉では、CO2 見える化の社会実証を進めてきており、「AEMS（エリアエネルギー管理システム)」を導入。各家庭に CO2 の削減を推進してもらうだけでなく、災害時にどの設備に優先的にエネルギーを供給するかの判断にも役立つことから、防災にも活用できるシステムになっている。
  - 「マルチモビリティシェアリングサービス」や「農業」にも取り組んでいる。

- 株式会社東芝　高木氏
  - 宮古島における再生可能エネルギーの実証試験について説明。
  - 東芝は、沖縄電力が宮古島で 2010 年から実施する離島マイクログリッドシステム実証試験に関する設備の一括納入の契約を締結。
  - 本実証試験は、経済産業省資源エネルギー庁の「平成 21 年度離島独立型系統新エネルギー導入実証事業」に採択されたもので、宮古島の独立型電力系統に、出力変動が大きい太陽光発電等の再生可能エネルギーを大量導入した場合の電力系統へ与える影響を把握するとともに系統の安定化対策に関する検証を行うことを目的としている。
  - 宮古島ではガスタービン発電、火力発電、風力発電設備が設置されていたが、2010 年 10 月に 4MW のメガソーラーが加わり、稼働を開始。また、同発電設備に 4.1MW の NAS 電池を装備した上、蓄電池の一部には東芝が開発した新型二次電池 SCiBTM を初めて採用した。
  - 実証実験を通じ、発電量が不安定になりがちな太陽光発電などの再生可能エネルギーを大量に導入しても、蓄電池をうまく活用すれば電力供給系統の安定化が可能であることが確認されたことから、海外の島嶼国でも十分活用できると考える。

- 東京ミッドタウンマネジメント株式会社　恒川氏
  - 東京ミッドタウンの環境への取り組みについて説明を受けた後、中水処理場、コジェネレーション室、コントロールセンターを見学。
  - 東京ミッドタウンを運営管理する三井不動産の環境に対する考え方のもと、東京ミッドタウンにおいても環境宣言を制定し、積極的に環境問題に取り組んでいる。
  - 東京ミッドタウンの環境に関する活動の中で、緑に関する活動を重要視している。開発敷地面積 10 万㎡の約 40%を緑地として確保しており、東京の中では公共の

公園を除き最大規模の緑地となっている。

- 緑地の効果により、東京ミッドタウンの敷地は、周辺よりも昼まで約 3℃、夜で約 1℃気温が低いという結果も出ており、周辺温度環境の改善に貢献している。
- 東京ミッドタウンでは中水道システムを導入し、雨水や生活用排水は一旦処理した後にトイレ洗浄や屋外植栽への散水に再利用する。このような取り組みにより、上水道の使用を抑制し、約 540 世帯分の水を節約できる。
- コジェネレーションにおいては、1 台 900kw の設備二基を擁し、東京ミッドタウン全体約 15%の電気を賄っている。
- コントロールセンターは 24 時間常駐。昼間は 35 人、夜間は 5 人体制であり、半数ずつが機器制御と防犯を担当。

質疑応答

- 蓄電池の耐用年数は何年か。(トリニダード･トバゴ　Mr. Kishan Gurjoat KUMARSINGH)
  →15 年。(東芝)
  →17 年。100%リサイクル可能。(日立製作所)

- グリーンフロートを建設する費用はどれくらいかかるのか。(パプア・ニューギニア Mr. Joe Neil POKANA)
  →40 兆円から 50 兆円くらいを見込んでいるが、もっとコストを下げないと現実的ではないと思っている。投資ファンドと排出権取引による資金調達を想定している。(清水建設)

- グリーンフロートについては実現可能なところまで来ていることについて大変興味を覚えた。また自国の若者たちに持続可能な教育を行っていくことが重要だと思う。(パプア・ニューギニア　Ms. Rensie Xhira Bado PANDA)

- 今回説明を聞いたような高度な技術を理解するのは簡単ではない。また、技術の採用については各国の政府や省庁が決定権を持っているので、本国に帰ってから説明するにあたり、電子ファイルでプレゼン資料を送付してもらえないか。(モルディブ　Mr. Mohamed ZAHIR)
  →コンフィデンシャルな内容も含んでいるものもあり、検討し、追ってご連絡する。(外務省　飯野氏)

- 島嶼国にはまだ利活用のできていない土地も沢山あることから、グリーンフロートの必要性は現時点ではあまり感じていない。一方で柏の葉プロジェクトは大変興味があるので、できればパートナーシップを組んで、エネルギー効率や環境が良くないわが国にも導入したい。(グレナダ　Ms. Dessima Margaret WILLIAM)

- (東京ミッドタウンの中水処理場で) この水はどこから来ているのか。また中処理にはどれくらいの時間を要するのか。((モルディブ　Mr. Mohamed ZAHIR)
  →ビルのキッチン等からの生活用排水である。トイレの排水等は使っていない。中処理にはほぼ丸 1 日を要する。(東京ミッドタウン)

写真 7. 日立プラントテクノロジーにて水浄化システムの説明を受ける参加者

写真 8. 日立プラントテクノロジーにて水浄化システムの展示パネルを見学する参加者

写真 9.　日立プラントテクノロジーにてプラント建設の展示パネルを見学する参加者

写真 10.　東京ミッドタウンで説明を聞く参加者

写真 11.　東京ミッドタウンを見学する参加者

写真 12.　参加者集合写真

5. COP18 への参加

5.1. COP18 における論点

国連気候変動枠組条約第 18 回締約国会議（COP18）及び京都議定書第 8 回締約国会議（COP/MOP8）が、2012 年 11 月 26 日～12 月 7 日まで、カタールのドーハで開催された。

気候変動枠組条約締約国会議（COP）は、1992 年にブラジルのリオ・デ・ジャネイロで開催された国連地球サミットで採択された「気候変動枠組条約」の締約国が、温室効果ガスの排出量削減策を協議する会議である。1995 年の第 1 回より世界各国を会場として毎年開催されており、今般、第 18 回目(COP18)を迎えた。

COP18 への参加に先駆け、フォローすべき主な国際交渉の論点を、主要トピック別にまとめた。

5.1.1.条約の下での長期的協力の行動のための特別作業部会（AWG-LCA）

① 緑の気候基金（GCF）

■これまでの経緯

- 緑の気候基金(GCF)は、カンクン会合において設立が決定された新たな基金である。GCFは、途上国の緩和、適応、及び技術援助に必要な資金の運営機関としての役割を目的としている。

- ダーバン会合において、GCFの運営に関する基本設計(Governing Instrument)が承認され、地球環境ファシリティ(GEF)と並び、条約の資金メカニズムの運営主体として位置付けられた。基金のトラスティは暫定的に世界銀行が務めることとなった。3年後に暫定措置に関するレビューが行われることが決定している。

■議長及びホスト国の選定について

- 第一回理事会（2012年8月）において、24カ国の理事から、南アフリカとオーストラリアが1年間の任期で共同議長に選出された。

- GCFの誘致国（ホスト国）選定に関する決定書が採択され、立候補を表明していた6カ国（ドイツ、メキシコ、ナミビア、ポーランド、韓国、スイス）について、第二回理事会（2012年10月）におけるホスト国選定委員会により韓国が選ばれ、ドーハ会合で認定を受けることとなっている。

■GCFの運用について

- GCFは、2013年12月には暫定措置からの移行を完了し、ホスト国の中に事務局が常設され、正式稼動する予定である。また、GCFの支援は、プロジェクト、プログラム、及びその他の活動という幅広い対策が資金供与の対象とされ、柔軟性のある支援が期待されている。具体的な分野として、緩和、適応、REDD＋に加え、キャパシティ・ビルディング、技術開発・移転や途上国の国別報告書等の作成が挙げられている。

- 資金供与の手段として、セクター、分野、資金のアクセス手法に特化したテーマ別資

金窓口（thematic windows）の設置が検討されている。

- 第一回理事会にて承認された作業計画において、2013年末までを目処に制度的側面の整備（ホスト国の選定、事務局の設置等)、基金の戦略的政策の策定（財源形態、民間資金の活用、アクセス・モダリティ、資源配分、追加性等)、国別プログラムと政策（プロジェクトの選定、評価基準、モニタリング等）について段階的に詳細を決めていくこととなっている。

■緑の気候基金に関する主要国と日本の主な主張

日本

- 基金の資金調達には公的資金のみならず民間資金も含むことを提案。
- 特定の資金調達手法の採用に反対。

G77/中国（途上国グループ）

- 2013年から2020年の間の資金ギャップを埋めるため、資金規模を一層拡大し、新たな追加的な資金供与を確保する必要性を強調。
- 緩和と適応の間での資金割り当てのバランス、途上国のニーズに基づいた資金規模に期待。
- 先進国に対し、中期での中間資金供与目標の検討を提案。
- 先進国の国内総生産の規模に応じた拠出による資金調達を提案。

AOSIS

- 小島嶼途上国（SIDS）やLDC専用の資金窓口の設置や、資金補填プロセスの導入を提案。
- 基金の資金調達は、国際航空、海運への課金等で賄う提案。

米国

- 中期の資金約束には、途上国の中期の緩和約束の用意があることが前提。
- 特定の資金調達手法の採用に反対（日本と同じ)。

スイス

- 国際炭素税による資金調達を提案。

② MRV の実施

■これまでの経緯

- カンクン合意において、全ての締約国に対し、隔年報告の作成により排出・吸収量や緩和行動に関する情報の報告が義務付けられ、それに対する検証プロセスが新設されることとなり、MRV (測定・報告・検証)制度の強化が図られた。また、途上国が実施する国際的な支援を受けた NAMAについてもMRVの対象となることとなり、MRV実施のガイドラインの策定が合意された。また、常設委員会が設置され、気候変動資金に関する情報交換のフォーラムの組織、運営組織への指針案や勧告の策定、専門家のインプットの提供、気候資金フローに関する隔年評価の準備等、ダーバン会合において同委員会の機能が決定された。

■隔年報告書の作成について
- ダーバン会合において排出削減の進捗等に関し各国が提出する隔年報告書の作成ガイドラインを策定し、先進国は2014年1月まで、途上国は2014年12月までに第1回隔年報告書を提出することが合意されている。隔年報告書の共通報告様式について、共通の表形式に関するワークショップ(2012年10月)において検討が進められている。
- 隔年報告書の国際的な評価・レビュー（IAR)の基本設計についても合意され、IARを実施する技術専門家チームの構成について、COP19で決定することとなっている。

■国別報告書、インベントリ報告書のレビューについて
- SBSTA 36において、先進国の作成する隔年報告書の共通報告様式の検討や、国別報告書、インベントリ報告書等のレビューについてのガイドラインの改定検討が進められた。事務局は、各種報告書の現行のレビュープロセスの見直しと、これまでのレビューの知見をとりまとめたテクニカルペーパーを作成し、SBSTA 37において検討されることとなった。

- 先進国のインベントリの報告義務を規定するガイドラインの試行作業を2013年春を目処に進め、COP19で採択されることとなっている。

- 締約国に対し、各種報告書のレビューガイドライン改定に関わる作業計画やタイムラインについての見解を2012年9月15日まで提出することが求められており、取りまとめ結果についてSBSTA 37で議論されることとなっている。

- 途上国が自国内で費用を賄うNAMAの国内MRVのガイダンス作成が着手され、検討が続けられることとなっている。

■途上国の国別報告書の作成支援する専門家グループ（CGE）について
- 2012年で現在のマンデートが終了することを受け、ICAをCFEの時期マンデートに追加することが議論されているが結論に出ず、今後の審議継続となっている。

■MRVの実施に関する主要国と日本の主な主張
<u>日本</u>
- 途上国によるMRV実施には、途上国で利用可能なデータの限界、MRVシステム確立の課題、オフセット・クレジットの二重計算の可能性等の懸念がある。

- 途上国支援に関するMRVの対象は、隔年報告書および国別報告書を通じた支援の報告（他の締約国への支援供与情報を含む）とする。

<u>EU</u>
- MRV（緩和行動、途上国支援含む）の進捗はダーバンでのパッケージ合意の根幹となることが期待される。

<u>中国</u>
- 先進国締約国による技術移転、資金、キャパシティ・ビルディングを介した支援供与は、適正にMRVされるべき。

- 緩和行動を含む非附属書Ⅰ国の国別報告書の強化は、途上国政府の限られた報告能力、国別報告書策定への不十分な支援規模や時間を要するプロセスなどから大きな課題と認識する。

- 途上国の国別報告実施のための体制強化には、十分な支援供与が必要。

- 報告プロセスの簡素化、効率性の向上、タイムリーかつ十分な支援が必要。

<u>インド</u>

- 実施手法や支援のMRVも野心の対象とされるべき。

<u>米国</u>

- 不定期な国別報告書提出やガイドラインの不在により支援の効果に関する情報が不足(費用対効果、効率性、透明性)。改正ガイドラインでこれら課題を対処すべき。

- 気候資金フローの拡大は国内の環境整備（enabling environment）の進展に依拠することを認識、途上国による透明性、グッドガバナンスおよび投資リスク低減に資する規制措置・経済政策の促進を要求。

③ 国としての適切名緩和行動（NAMA）

■これまでの経緯

- コペンハーゲン合意において､途上国が2020年のBAUに対してGHG排出を削減する目的で緩和行動（NAMA）を推進することが決定し、それを国際的なMRVの対象とすることとなった。各国は緩和行動の計画をUNFCCC事務局に提出することとなった。また、カンクン会合においては、NAMAに関するガイドラインの作成、NAMAレジストリの設置等が決まり、具体的なNAMAの実現に向けた進展がみられた。

- NAMAは、ユニラテラル NAMA（途上国が自主的に実施する緩和活動)、サポートNAMA(途上国が先進国等の援助を受けて行うNAMA)､及びクレジット創出NAMA（GHG排出削減効果をクレジット化することによって民間資金を呼び込むことを想定する）の三つの分類があると考えられているが、現時点で明確化されているものではない。

- ダーバン会合において、NAMA未提出の途上国に対し提出が促されたが、小島嶼開発途上国（SIDS）や後発開途上国（LDC）については柔軟な対応が適用された。また、NAMAの作成、提出においては、提出されたNAMAが十分に理解され、先進国からの資金に結びつくものとするために、想定条件や手法論、対象となるセクターやガス、実施に必要な具体的な支援、及び予想される緩和成果等を含めることが要請された。

■NAMAレジストリの設置について

- NAMAレジストリは、途上国の緩和行動の国際的な認識、また、支援ニーズと支援提供のマッチング促進の機能を備えるウェブベースのプラットフォームとして開発が進められている。レジストリへのアクセス権の付与等の制度上の検討課題は残っているが、本年10月1日に、マリ及びエチオピアのNAMAの情報が初めてTemporary NAMA Webpageに提出された。レジストリの正式な運用開始は2012年11月が予定されている。

■途上国自身が実施するNAMAの国内MRVガイドライン

- 途上国自身が実施するNAMAについても国内MRV（測定・報告・検証）の対象となることが決定したことを受け、SBSTA37において、ガイドラインを議論・策定することが要請されている。

■低炭素成長戦略（LEDS）の作成について

- カンクン合意において、途上国には、低排出型開発戦略の作成のための先進国からの財政的・技術的支援の必要性を認めつつ、低排出型開発戦略を策定することが要請されている。SBSTA/SBI36のワークショップにおいてLEDS作成に関する経験の共有の機会が持たれ、LEDSの定義づけや、先進国によるLEDS作成支援のあり方も含め、引き続き議論が行われることとなっている。

■NAMAに関する主要国と日本の主な主張

EU

- NAMAは多様で国家主導のもので、NAMA作成時に検討する想定条件は各国個別に作成される必要がある。

- NAMAのタイプ別で必要とされる情報について議論し、不確実性を削減し透明性を確保する一方、多様性の保全を目指すことを提案。

- GDP成長率やベースラインの排出量など、NAMAの基となる想定条件が明らかになることで、透明性の向上に繋がる。

- 先進国には、NAMA実施を支援する国際的な気候資金の重要性を認識し、自国の資金を提供する必要があると主張。

途上国

- 途上国のNAMA実施においては、先進国からの資金的、技術的支援が不可欠。

- NAMAレジストリでは、利用可能なNAMA支援に関する情報に全ての締約国がアクセスできるようにすることが重要であると強調。

④ 様々な手法のフレームワーク（Framework for Various Approaches: FVA）

■これまでの経緯

- ダーバン会合において、各国の国情に応じた様々な手法のフレームワーク（FVA）の実施が議論された。フレームワークはボトム・アップに各国からの提示、実施、形成がされるものであることが決定された。日本では、様々なアプローチの一つとして、二国間オフセット・クレジット制度が提唱されている。

■様々な手法のフレームワークに関する主要国と日本の主な主張

EU

- FVAは、各国ごとの特定の状況や目的と深く関係することから、各国は最も費用対効果のある適切な手法を検討する必要がある。また、途上国のNAMAとの重複を避ける必要がある。

- FVAにおいて実施される活動は、MRVの対象となり、追加的な排出削減をもたらすものであること。野心レベルを上げるためには、ディスカウント、保守的なアプローチでは不十分である。

- グローバルな削減目標の達成のためには、ダブルカウントの回避は必須。

- FVAにおける取引可能なクレジット（tradable credit）は、新メカニズムのクレジットと同じ基準を満たすものであることが望まれる。

- 非市場ベースのFVAを活用したHFCの排出増加抑制が期待される。

日本

- FVAには、COPのガイダンスのもと、中央集権型ガバナンスを備えたメカニズムと、各国が独自にフレームワークを検討し、実施する分散型ガバナンスのメカニズムの両方が想定される。特に、CDMでの経験を踏まえ、分散型ガバナンスのメカニズムの役割が重要である。

- COPによる報告システムや報告フォーマットが開発され、これを利用することにより、透明性を確保し、メカニズム間でのダブルカウンティングの回避に努めるべき。

- 分散型メカニズムにおいては、プロジェクト実施国が国の実情に合わせ、個別のメカニズムの基準（適用要件、レファレンス・シナリオ、モニタリング手法、第三者検証、プロジェクト管理、クレジットの発行等）を開発可能なこととする。また、透明性の確保のため、これらの基準は一般に公開されるべきである。

中国

- 様々な手法及び新たな市場メカニズムに以下のことを求める。
  - 費用対効果の高い排出削減手法であること
  - 途上国に排出削減義務をもたらすものでないこと
  - プロジェクトベース。方法と手順は京都議定書に相当するもの
  - 国際的な法的拘束力を持つ削減目標を有する先進国が活用できる制度
  - 先進国の国内における削減努力に対し、補完的に活用されること
  - ダブルカウンティングとならないこと

⑤ 新たな市場メカニズム (New Market Mechanism)

■これまでの経緯

- カンクン合意にて、国連レベルでルール形成を行う新たな市場メカニズムの創出を検討することが決定した。続くダーバン会合においては、新たな市場メカニズムは、実際に緩和成果をあげる基準を満たすものである必要が強調された。また、AWG-LCAに対し、このような枠組みを検討する作業計画を実行し、ドーハ会合への決定書送付を目指すことが要請された。

- 新たな市場メカニズムの形態には、CDMのようなプロジェクトベースに加え、セクトラルベースが検討されている。これまでに提案されているセクトラルベースの主なものには、セクトラル・クレディティング・メカニズム（SCM）、セクトラル・トレーディン

グ（ST）、NAMAクレディティング等がある。

■セクトラル・クレディティング・メカニズム（SCM）
- EU及びニュージーランドにより提案されている。実施スキームはCDMと類似しているが、国内のあるセクター全体を対象としている点が異なる。特定のセクターに対し、非拘束的な削減目標を設定し、目標超えて達成された部分がクレジットとして、事後発行(ex-post)される。

■セクトラル・トレーディング（ST）
- EU及びニュージーランドにより提案されている。現状の国内排出量取引制度と類似しているが、国内のあるセクター全体を対象としている。プロジェクト実施に先駆け削減目標（cap）を設定し、セクター全体の排出枠が事前（ex-ante）に配分される。

■NAMAクレディティング
- 韓国が主に提案しており、途上国が実施するNAMAの削減効果にクレジットを付与するもの（クレジット創出NAMA）。

■セクター別アプローチ
- 日本により提案されている。削減目標を定めるにあたり、産業・分野別に削減可能量を積み上げる方式をとり、世界レベルでの排出削減の達成を目的とするもの。産業部門の排出量の大半、民間・運輸部門の相当部分をカバーし、さらに途上国の参加も期待可能なスキーム。

■新たな市場メカニズムに関する主要国と日本の主な主張

<u>日本</u>
- 新たな市場メカニズムの基準はCOPによって定められるべき。CDMは標準化ベースラインやポジティブリストの採用により、引き続き改善が期待される。
- 新たな市場メカニズムはプロジェクトベース、セクターベースの両方が想定される。
- 提案されているセクトラル・クレディティング・メカニズム（SCM）における問題意識。
  - 全ての施設をモニタリングすることは不可能。特定の規模以上排出している施設のみをモニタリング対象とすること提案。
  - セクター全体において目標値以上の削減が達成された場合にのみクレジットが発行される場合、個別企業のインセンティブにつながらない。
  - SCMの対象となるセクターに、CDM等の既存のプロジェクトの実施者がいる場合の取り扱い。

<u>EU</u>
- 欧州連合は、政府が温室効果ガスの国内総排出量（総排出枠）を定め、それを個々の主体に排出枠として配分し、主体間の排出枠の一部の移転（または獲得）を認めるキャップ・アンド・トレードが主な方策であるべきだと考えており、セクター別アプローチは補完的なものだとしている。

<u>中国</u>
- 様々な手法及び新たな市場メカニズムに以下のことを求める。
  - 費用対効果の高い排出削減手法であること

・ 途上国に排出削減義務をもたらすものでないこと
・ プロジェクトベース。方法と手順は京都議定書に相当するもの
・ 国際的な法的拘束力を持つ削減目標を有する先進国が活用できる制度
・ 先進国の国内における削減努力に対し、補完的に活用されること
・ ダブルカウンティングとならないこと

5.1.2.実施に関する補助機関会合（SBI）

① 国別適応計画 (National Adaptation Plan : NAPs)

■これまでの経緯

- 気候変動の被害に脆弱な後発途上国(LDC)における適応プロジェクトの推進を目的とし、後発開発途上国基金（LDCF）の支援により国別適応行動計画(National Adaptation Programmes of Action: NAPAs)が策定され、様々な適応プロジェクトが進められている。国連では、途上国の適応策の一層の強化を図るための枠組みの検討を推進することを目的とし、カンクン会合において「カンクン適応枠組み」を合意した。

- カンクン適応枠組みのもと、後発途上国(LDC)がNAPAs実施の経験に基づいて国別適応計画（NAPs）を策定、実施するプロセスを進め、同様の取り組みを他の途上国に対しても採用することや、適応プロジェクト実施のための追加的な資金、技術、キャパシティ・ビルディングの実施が合意された。

■適応委員会の設置について

- 適応対策の促進を図る目的の諮問機関の役割を担う適応委員会をCOP監督下に設置することが決定した。

- ダーバン会合において、適応委員会の活動内容や国別適応計画(NAPs)のためのガイドラインが合意され、適応委員会において当初3年の作業計画の策定が進められており、ドーハ会合で採択される予定である。

■先進国からの支援について

- SBI 36において、先進締約国に対し、NAP プロセスへの資金援助を集めるよう求め、LDC諸国への資金、技術、キャパシティ・ビルディングへの資金供与継続への要請を続けることとしている。さらに、NAP プロセスに必要な支援の分析およびとりまとめの実施や、途上国への支援を可能にする政策およびプログラムについてのガイダンスに関し、SBI 37 において継続審議されることとなっている。

■国別適応計画に関する主要国の主な主張

G77/中国（途上国グループ）

- 国別適応計画は、適応への取り組みが地方レベルで行われることを前提とし、柔軟で国家主導型であるべき。
- 国別適応計画プロセスはNAPAプロセスとは異なるプロセスであり、策定にあたっては、先進国からの支援が不可欠。

ノルウェーおよびその他の国

- 国別適応計画の策定対象は、全ての途上国ではなく、LDCsのみとするべき。

② 損失と損害 (Loss and Damage)

■これまでの経緯

- カンクン会合において、気候変動に伴う損失と損害(Loss and Damage)に関する作業計画の策定が決定された。これを受け、締約国及び関係機関には、気候リスク保険機関の開設、リスクの管理と低減手法、緩慢に襲う自称に対応するための手法、及びステークホルダーの関与について情報や見解の提示が求められた。

■作業計画の策定について

- ダーバン会合における作業計画において、途上国に対し、極端な気象現象や緩慢に襲う事象に関連する全ての分野について、損失・損害データ等を用いた国内評価の実施の重要性が認識された。

- 気候変動に伴う損失と損害に対するリスク及び情報の評価、対処方法、及び実施強化のための条約の役割の三項目を重要テーマとした作業計画の策定が進められている。

- COP 18において、損失・損害に対応する国際的メカニズムの設置が検討されることとなっている。同メカニズムの構築において、損失・損害の評価及び対応に関する要素や条約の主導的役割についての要素を盛り込むことが期待されている。

■損失と損害に関する主要国の主な主張

G-77/中国

- 損失・損害に関する国際メカニズムには損失・損害の評価および対応に関する要素や条約の主導的役割についての要素を盛り込むべき。
- 全ての国に一律のアプローチを講じることを懸念し、地域的な気候変動の影響の違いを考慮する必要性を強調。

米国

- 損失・損害リスクの物理的決定要因と、社会経済的な促進要因や人間の脆弱性にするデータの必要性を指摘。
- リスク評価と損失・損害の評価を混同させることに警戒感。

AOSIS

- 損失・損害に対応する国際的メカニズムの設置やキャパシティ・ビルディングに関する新しいプログラムの推進を支持。

③ 対応措置の影響に関するフォーラム

■これまでの経緯

- ダーバン会合において、「対応措置の影響に関するフォーラム」の設置が決定された。同フォーラムは、気候変動枠組み条約の履行において先進国が推進する温暖化対策等によって途上国に引き起こされる悪影響気候変動の悪影響又は対応措置の実施による影響に起因する途上国の個別のニーズや懸念に対処するためにとるべき措置(資金供与、保険、技術移転等)について検討する場となる。

■フォーラムの作業構成、作業計画について
- SBSTA/SBI 36において、フォーラムの作業構成及び作業計画の運用開始に向けた議論が行われた。作業計画は、ダーバン会合の決定書に規定される8つの分野に沿って構成され、途上国締約国の特定のニーズおよび懸念材料に対応するため、2013年中までに各分野での行動･アウトプットについてまとめることとなっている。SBSTA/SBI37においては、8項目のうち、対応措置の正負の影響に関する理解の促進における情報・知見の共有、影響の評価、分析、及び低炭素社会の実現に向けた世界全体及び国ごとの知見の構築について検討が進められる。

- 対応措置に関し、途上国からは具体的に、先進国が採用する貿易関連の措置および貿易の経済的、社会的な影響や、EUの排出取引スキームに航空輸送が含まれたことなど、ユニラテラルな措置について懸念が表明されている。

5.1.3.科学上及び技術上の助言に関する補助機関会合（SBSTA）

① 影響・脆弱性・適応に関するナイロビ作業計画(NWP)
■これまでの経緯
- ナイロビ作業計画(NWP)は、ブエノスアイレス会合において採択された「適応策と対応措置に関するブエノスアイレス作業計画」に基づき策定された「適応5ヵ年作業計画」に始まり、「気候変動の影響、脆弱性及び適用に関する5ヵ年作業計画（COP12 でナイロビ作業計画と改名）」と称される取り組みである。すべての国、特に後発開発途上国、島嶼国を含む途上国が、影響、脆弱性と適応への理解を深め、適応の実践的活動と政策を可能にすることを目的としている。

■NWPの作業分野について
- ダーバン会合においては、NWPの作業分野を再検討し、NWPの目的をより円滑に支援する方法について、COP19への提案提出を目指すことが要請された。また、水と気候変動の影響および適応戦略に関するワークショップや生態系ベース手法に関するワークショップの開催を計画することや、国別適応計画プロセスの事例研究の取りまとめをSBSTA 37までに用意すること合意された。

- SBSTA 36においてNWPでの進展状況が報告され、締約国および関連組織に対し、NWPの下での可能な将来作業分野に関する意見を2012年9月17日までに事務局に提出するよう求め、SBSTA 38までに結果が取りまとめられることとなった。

■水と気候変動の影響及び適応戦略に関するワークショップについて
- 2012年7月に開催された水と気候変動の影響及び適応戦略に関するワークショップでは、ナイロビ作業計画の下での水および包括的な水資源管理において優先的に推進すべき活動として、次の項目が挙げられた。

- 気候変動の水資源への影響を理解するための観測データの整備とその解釈
  - 制度の高い観測データの収集
  - データ観測や収集に関する国際標準の確立
  - 観測システムの適切な配備への投資

- 水資源に対する気候変動の影響の評価
  - 気候変動以外の要因の考慮
  - 生態系、ジェンダーの考慮
- 地域、国、国家間レベルでの適応計画の策定と実践
- コミュニケーション、ステークホルダーの動員、知識の共有と管理

② REDD+

■これまでの経緯

- REDD+は、森林からの排出を削減し、炭素ストックを増加させる活動にインセンティブを与える世界的なメカニズムであり、2013 年以降の新しい制度枠組において検討されている。カンクン合意では、REDD+の概要が明記され、議論の進展が見られた。

■資金オプションについて

- ダーバン会合においては、REDD+ 実施のための資金オプションについて、新しい追加的かつ予測可能な結果ベースの資金調達には、公共、民間、二国間ドナー、多国間ドナーなど、代替財源を含めてさまざまな資金源がありうるということが合意された。

- 締約国に対し、2012年5月5日までに、結果ベースの行動に資金調達するモダリティと手順について意見を提出することから要請され、達成された前進とCOP 18への提言を報告することを目的として、提出された意見、テクニカルペーパー、ワークショップの結果の報告書を検討するよう要請した。技術面に関しては、REDD＋実施のためのセーフガードに関する情報提供システムのガイダンスや森林REL/RLのための様式、具体化するための課題が示された。

- ドーハ会合において、REDD＋フェーズ3での新しい市場メカニズム、REDD＋の準備段階を支援するギャップの調整、炭素削減以外の関連活動への支援（適応策等）、定義に関する作業（ベースライン、参加要件、民間セクター関与のモダリティ、持続可能な森林管理）等の決定が期待されている。

■REDD+の活動の方法論的ガイダンスについて

- SBSTA 36において、REDD+の活動の方法論的ガイダンスに関して議長が提出した結論案が採択され、ドーハ会合にて最終案が提出される予定である。国家森林モニタリングシステム(NFMS) 及び排出源ごとの排出量と吸収源ごとの吸収量のMRVに関しては、モダリティを発展させる作業がドーハ会合まで続けられることとなった。また、森林減少・劣化の要因への対処方法に関する検討についても継続されることとなった。

■グリーン気候基金（GCF）におけるEDD＋の窓口について

- AWG-LCA15の全体会合において、グリーン気候基金（GCF）にREDD＋の窓口を設置することが議論され、多くの国が賛同した。

■REDD＋に関する日本と主要国の主な主張

<u>EU</u>

- 資金調達方法の検討においては、結果ベースのREDD+プロジェクトの開発において、多国間及び二国間のREDD+イニシアティブの新しいモダリティと手順、及び自主的な炭素市場から得られた教訓を情報として利用すべきである。

- REDD+の排出削減結果は第三者レビューにより評価されるべき。

日本
- 資金調達に関し、REDD+のデモンストレーション活動の経験等に基づき、各国が資金源の種類（公的、民間）やチャネル（市場/非市場、多国間/二国間等）を選ぶことを提案。

中国
- REDD+の資金源は公的なものが望まれる。
- 途上国政府に対して、割賦方式で結果ベースの資金を供与することを提案。
- 資金の配分を評価及び促進するため、REDD+ 技術委員会の設置を提案。

インド
- ホスト国政府にインセンティブ与える方式の資金調達を提案。

③ CCSのCDM化に関する手続き

■これまでの経緯

- CCSのCDM化はコペンハーゲン会合で承認され、ダーバン会合においてCDM化の基本的なプロセス（貯留サイトの条件、モニタリング期間、CER発行・非永続性、漏洩リスクの取り扱い等）が合意された。これにより、CCSをCDMプロジェクトとして登録申請するためのプロセスが明確化された。

■複数国にまたがるプロジェクトの適格性について

- SBSTA 36において、複数国に渡って行われるCCSプロジェクトの適格性及びCCS活動から漏洩量超過が発生した場合にキャンセルされるCERのグローバルリザーブ口座の設置が議論されたが、いずれも最終決着はしていない。2012年8月13日までに締約国、政府間組織等から引き続き意見の提出を求めることとなっており、UNFCCC事務局はプロジェクトが及ぼす影響に関するテクニカルペーパーを作成し、SBSTA 37 での審議にかけることとなっている。

5.1.4.ダーバン・プラットフォーム（ADP）の議論

■これまでの経緯

- ダーバン会合において、すべての国を対象とする法的枠組みを2015年に採択、2020年以降に発効することが合意され、このための「強化された行動のためのダーバン・プラットフォーム特別作業部会」（ADP）が立ち上げられた。ADPの設置に合意したことは、ダーバン会合の最大の成果であった。ADPは、2015年までにすべての国に適用される議定書、法的文書または法的拘束力を有する合意に達し、2020 年に発効し、実施に移すことを目的とし、「2020年以降の新たな枠組みの構築」及び「2020年以前の緩和に関する野心レベルの向上」の二つのワークストリームで議論が進められることとなった。

■議長の選出について

- ADP の初会合が2012年5月に開催され、2012年中は新枠組みのアイデアの構築と作業計画の策定が目指されていたが、作業計画については、COP18における議論に持ち越され

ている。また、ADP1においては2012年-2013年前半の共同議長としてインド（マウスカル氏）とノルウェー（ドブランド氏）が選出されており、COP18で承認を受けることとなっている。

■新たな枠組みの構築について
- 「2020年以降の新たな枠組みの構築」に関しては、すべての国に適用される法的拘束力を有する枠組みであるとしており、制度の作り上げにおいては、新興国や途上国の参加に向け、先進国からの技術、ノウハウ、経験の共有が重要であると認識されている。

■野心レベルの向上について
- 「2020年以前の緩和に関する野心レベルの向上」に関しては、ADP 1において、緩和の野心引き上げのためのワークショップが開催され、各国から挙げられたオプションが議論された。特に、現在までに各国から出されている緩和のプレッジは気温上昇を2度以下に押さえるのに必要な60%程度である点を踏まえ、ギャップの縮小を目的とした案が出された。

■野心レベルの対象について
- 途上国側から、「野心レベル」の対象が、緩和に限らず適応や先進国による資金支援等も含む広い範囲を含むものとして捉えられるべきであるという懸念が表明された。
- 野心レベルの引き上げに際する公平性（先進国・途上国間及び途上国間の公平性）についても議論がされている。また、野心レベルの引き上げの対象が、2020年までの目標であるのか、もしくは、2020年以降の新枠組みにおけるものであるのかについても、途上国と先進国はそれぞれの立場で異なる見解となっている。野心レベルの引き上げをどのような手段を通じて実現していくかについても、今後の議論の課題となっている。ADPでは、作業計画を策定し、野心レベルをあげる手段のリスト化、テクニカルペーパーの作成と緩和ポテンシャル評価のための技術的な対話開催などが提案されている。

■三つの議論の場について
- ADP 1では、二つのワークストリームに加え、条約の下での「共通だが差異ある責任及び各国の能力の原則」及び「衡平性の原則」の重要性が確認され、今後は「条約の原則（Principles of the Convention）」を加えた三つの議論の場が持たれることとなった。締約国に対しては、ADPの有り方に関する更なるサブミッションが求められ、今後、それらの意見を踏まえ、2015年半ばを目処に合意文書案の形成が進められる予定である。

■ダーバン・プラットフォームに関する日本と主要国の主な主張

<u>EU</u>
- 全ての締約国が約束をする新しい議定書を支持。
- WG-LCAのレビューに合わせ、2015年に第二約束期間の約束の野心レベルのレビューを行うことを提案。

<u>日本</u>
- 新しい全ての締約国への適用可能性、永続的で柔軟性があり、ダイナミックな構造とすることを主張。
- シンガポールの主張する、各国の国情（内容や制約条件、貢献度）への配慮を支持。
- 2015年の完了を目指し、2013年から作業計画の具体的な検討を開始する。

インド

- 衡平性、CBDR、歴史的責任に基づく差異化を求め、ポスト2020年のアレンジでは、
- 先進国による開発途上国援助の量的および特定する条件も含めるべき。
- ADPは新しい要素を検討できるだけの柔軟性をもつべきと主張。新しい要素には、気候変動に関する政府間パネル（IPCC）、2013-15年のレビュー等が含まれるべき。

中国

- 衡平性、CBDR、歴史的責任に基づく差異化を求めつつも、法的拘束力のある新たな国際枠組みへの参加の可能性を示唆。

AOSIS

- 各国の削減目標レベルの設定においては、京都議定書における各国を「二分（binary division）」する方式ではなく、多様な差異化レベルで各国をリストアップし、状況の変化に合わせて、より厳格な要件を有するリストへと「卒業（graduate）」できる方式の検討を提案。
- 2020年までの1.5度目標達成を支持し、中国やインドに対しても削減を要求。

米国

- 新しい制度における目標達成はUNFCCCの下での取り組み以外の他国間組織の努力や自主的名行動も含まれるべき。（EU、アフリカグループも支持）

5.1.5.京都議定書の下での附属書 I 国の更なる約束に関する特別作業部会（AWG-KP）

① 京都議定書第二束期間

■これまでの経緯

- ダーバン会合において京都議定第二約束期間の設置が合意され、2013年1月1日より開始することとされた。

■第二約束期間の長さについて

- 第二約束期間の長さについて、2013年～2017年の5年間、もしくは2013年～2020年までの8年間の二案が提示された。主に途上国側は、第二約束期間に参加する先進国の削減目標が低い値で設定された場合、この低い目標値が長く継続することを懸念し、5年を主張している。

- 先進国側は、ダーバン・プラットフォームで検討されている新しい枠組みの開始時期との整合性を重視し、8年を主張している。EUに関しては、中間レビューを設け、途中で目標を引き上げる前提の8年としている。AWG-KP 17（前半）において決着予定であったが実現しなかったため、ドーハ会合において合意する必要がある。

■第二約束期間の排出削減目標設定 (QELROs) (附属書Bの改正）について

- ダーバン会合において京都議定書附属書Bの改正案が作成されたが、第二約束期間の長さが決定しなかったことから各国の削減目標値の書き込みに至っていない。このことから、ドーハ会合において第二約束期間の長さについて最終合意し、附属書Bの改正作業を完了する必要がある。

- 第一約束期間の終了から第二約束期間の拘束力が発効するまでの間に生じることになった「空白期間」の暫定的措置について合意し、第二約束期間への速やかな移行を図る必要がある。

- 削減目標の決定において、第一約束期間における余剰AAUのバンキングが第二約束期間の削減効果にもたらす影響が懸念されており、島嶼国連合(AOSIS)やアフリカグループは、バンキングを厳しく制限することを主張している。これにより、何らかの制限をかけることで合意した場合、議定の改正が採択される必要がある。

■第二約束期間に参加しない国のCDMの利用について
- 各国の主張が対立し、合意に達していないが、COP18に決定の必要がある。

- 合意の結果によっては、削減目標を設定しない締約国のCDMは利用できず、新たなCDM事業の登録もできず、排出枠も発行されないということになりうる。

■京都議定書第二約束期間に関する日本と主要国の主な主張

日本

- 京都議定書における削減義務を持つ対象国は一部の先進国に限定されており、現在の世界的な排出の実態を反映するものではない。

- 京都議定書の第二約束期間には参加しないが、京都議定書は離脱せず、CDMなどの要素については、改善を加えて活用可能であることを主張。

EU

- 米国や中国を含む新たな法的拘束力のある国際的な枠組みの構築に向けた作業を開始することを条件に、第二約束期間の設定と参加を表明。8年間の約束期間を支持。

- WG-LCAのレビューに合わせ、2015年に排出削減目標のレビューの実施を提案。

- 第二約束期間を受け入れる国のみ京都メカニズムの継続利用を認める。

G77/中国（途上国グループ）

- 2013年以降も先進国に対し大幅な排出削減を要求し、新興・途上国の発展を推進すべく、資金・技術支援の継続を主張。5年間の約束期間を支持。

- 8年の約束期間に見合う野心レベルへの引き上げを主張。

- 余剰AAUのバンキングの上限を第2約束期間の2.5％と提案。途上国には、削減目標レベルを強化できるだけの資金提供がされるべき。

- 第二約束期間に参加しない国の京都メカニズムの継続利用を認めない。

カナダ、ロシア

- 第二約束期間に期待される削減減規模が不十分であることを理由に、第二約束期間

設定を受け入れないことを表明。
- カナダは京都議定書から離脱を表明。

米国
- 第二約束期間設定の賛否を明確にはしていないが、第二約束期間の削減規模に関し、日本と同様の懸念を表明。

5.2. COP18 の概要と成果

COP18 においては、「強化された行動のためのダーバン・プラットフォーム特別作業部会（ADP）」、「京都議定書の下での附属書 I 国の更なる約束に関する特別作業部会（AWG-KP）」、「条約の下での長期的協力の行動のための特別作業部会（AWG-LCA）」及び「科学上及び技術上の助言に関する補助機関会合（SBSTA）」と「実施に関する補助機関会合（SBI）」の二つの補助機関会合における事務レベルの交渉を経て、閣僚間での協議を重ねた結果、以下に示す一連の COP 及び CMP の決定が「ドーハ気候ゲートウェイ」として採択された。

1. ADP の作業計画を含む COP 決定

- 2013 年以降の作業計画及び議長アレンジメントが決定された。
- 2013 年は ADP を 2 回開催し、4 月と 9 月の追加会合の可能性を検討すること、2014 年及び 2015 年についても少なくとも 2 回の会合を開催することとし、具体的には前年中に決定すること、来年は 2 つのワークストリーム （「2020 年以降の将来枠組み」及び「2020 年までの緩和の野心向上）において、各国から提出される意見を基にラウンドテーブルやワークショップを開催し、より焦点を絞った実質的な議論に移行すること等が決定された。
- 2015 年 5 月までに交渉テキストを準備することを目指して、2014 年末の COP20 に向けて交渉テキストの要素について検討を進めることが決定され、来年以降の交渉の段取りが明らかになった。

2. 京都議定書改正案の採択等に関する CMP 決定

- 第二約束期間中の各国の排出抑制及び削減に関する約束が記載された附属書 B を含む改正案が成果文書として採択された。第二約束期間の長さを 8 年とし、2014 年までに各国の約束の野心の引き上げに関する検討の機会を設けること等が決定された。
- AWG-KP はその作業を完了し、終了することとなった。
- クリーン開発メカニズム（CDM）について、第二約束期間に参加しない国も CDM プロジェクトに参加して 2013 年以降の CDM クレジット （CER）を原始取得（自国に転送）することが可能であることが確認された。ただし、第二約束期間における共同実施（同 6 条）や国際排出量取引（議定書 17 条）に参加してクレジットの国際的な獲得・移転を行うことは、第二約束期間に参加する国のみに認められることとなった（なお、第一約束期間の調整期間中（2013 年から 2015 年後半以降まで）の我が国の国際排出量取引への参加は引き続き可能）。
- 京都議定書における森林・農地等吸収源等 （LULUCF）の取り扱いについて、第二約

束期間に参加しない国も含め第二約束期間におけるルールにしたがって算定・報告を行うこととなった。

3. AWG-LCA に基づく合意された成果に関する COP 決定

- COP17 のダーバン決定で立ち上げられた新たな組織やプロセスを実施に移すための、バリ行動計画の全ての議題 に関する一連の決定が採択されたことにより、AWG-LCA が多くの成果を上げ「合意された成果」を得たことが確認され、同作業部会は作業を終了した。一部の議題については、今後補助機関等で技術的な検討・作業を継続することとなった。
- 日本が提案している二国間オフセット・クレジット制度（JCM /BOCM）を含む様々なアプローチについては、実施のための「枠組み」について作業計画を実行していくことが決定され、「枠組み」の機能や役割、国際的 なクレジットの移動に関してダブルカウントを防止する方法等を検討していくこととなった。
- カンクン合意に基づき先進国が今後 2 年おきに提出する隔年 報告書に関して、JCM/BOCM など市場メカニズムの活用に関する報告事項を含む共通報告様式について合意された。
- 気候資金に関する一連の COP 決定
- 先進国全体としての短期資金コミットメント達成の認知、長期資金に関する作業計画の 2013 年までの延長、COP19 の際の 長期資金に関するハイレベル閣僚級対話の開催、フォーラムの編成を含む常設委員会の 2013～2015 年の作業計画の承認、緑の気候基金（GCF）のホス ト国承認（韓国）等の決定が採択された。
- 先進国全体に対し、少なくとも短期資金の年平均の資金を 2013 年から 2015 年まで達成するために一層努力することを奨励することとなった。
- 先進国全てに対し、2020 年までに年間 1000 億ドルの気候資金を動員するとの共通の目標に向けて、多様な資金源からの資金（動員）の拡大を求めるとともに、これに関する戦略がアプローチについての情報を先進国が COP19 までに提出することを招請し、長期資金に関する検討作業を 1 年間延長することとなった。

4. 気候変動による損失と被害（ロス&ダメージ）に関する COP 決定

- COP19 において、気候変動の影響に脆弱な国における被害を軽減に取り組むための世界的なメカニズムなどの制度を設立することとなった。

AWG-KP 及び AWG-LCA は、COP18 をもって作業を完了し、終了し、2013 年以降の「強化された行動のためのダーバン・プラットフォーム特別作業部会（ADP）」における交渉の段取りについて合意され、「2020 年以降の新しい法的枠組みに関する 2015 年までの合意に向け交渉の基礎的アレンジメントを整えた」とのメッセージを示すという日本政府の目標が達成された。

5.3. COP18 におけるサイドイベント及び関係機関との会合

JICA は、COP18 におけるサイドイベント等や関係機関との会合への参加を通じて、気候変動分野の途上国支援の取り組みを紹介し、各国の関係者と意見交換を行った。以下に、JICA が共催した主なイベントの一覧を示す。

I. 低炭素技術の普及や気候変動に対する適応に関するサイドイベント
① 途上国における適切な緩和行動（NAMA）に関する国際パートナーシップ (Joining efforts to support the preparation and implementation of NAMA: an international partnership) 共催機関：国連気候変動枠組条約（UNFCCC）事務局ほか 概要：途上国における低炭素成長を推進するため、JICA や世銀などの国際開発機関が UNFCCC 事務局と協力してパートナーシップを立ち上げ、これまでの NAMA 支援事例を共有し、今後の活動の方向性について議論する。
② 途上国における温室効果ガス排出削減の可能性と日本の協力 (Mid-term Emission Reduction Potential in Developing Country and Japanese Cooperation) 共催機関：日本エネルギー経済研究所ほか 概要：我が国の優れた技術やノウハウを活用し、途上国における低炭素成長を実現するため、途上国における温室効果ガス排出削減の可能性を議論し、国際協力のあり方について意見交換を行う。
③ 途上国開発と気候変動適応（Development and Adaptation Days） 共催機関：国際赤十字気候センター、地球環境ファシリティ（GEF） 概要：気候変動の影響や自然災害に対して脆弱な途上国において、国やコミュニティなどの様々なレベルで適切な適応策が講じられるよう、世界各国の研究機関、実務機関が一堂に会して意見交換を行う。
II ジア諸国の気候変動問題への取り組みに関するサイドイベント
④ ベトナム（Viet Nam: Policy development, financial mechanism, technology transfer to respond to climate change） 共催機関：ベトナム天然資源環境省、環境省（日本）ほか 概要：ベトナム政府は 2008 年に「気候変動対策にかかる国家目標プログラム」を策定、JICA などとの政策対話、政策・制度づくり、技術・資金協力を活用し包括的な取り組みを行っており、こうしたベトナムにおける取り組みを国際社会と共有する。
⑤ インドネシア（Indonesia Climate Change Day） 共催機関：インドネシア国家気候変動評議会（DNPI）

概要：市場メカニズムや持続可能なエネルギー政策・グリーン成長や投資・地域活動・若者による活動などをテーマとしたセッションや展示の発表。JICA が実施中の「気候変動対策能力強化プロジェクト」の活動を紹介する。
III. 気候変動対策にも貢献する持続可能な自然環境保全に関するサイドイベント
⑥ 国家モニタリングシステムの役割（What Can National Forest Monitoring Systems do? - Development of NFMS and MRV system for REDD+） 共催機関：独立行政法人 森林総合研究所 (FFPRI) 概要:森林炭素蓄積インベントリのための国家森林モニタリングシステム開発の可能性と課題を、途上国における実績と経験に基づき議論する。JICA による技術面での取り組みを紹介するほか、FFPRI の REDD+技術解説書を公開する。
⑦ 熱帯雨林におけるコミュニティ参加型森林管理の取り組み (REDD+ MRV: Capturing benefits from community forest management in the tropics) 共催機関：国際熱帯木材機構（ITTO）ほか 概要:熱帯地域の持続可能な森林管理の枠組みにおいて、一貫性と透明性のある REDD+活動の測定・報告・検証（MRV）システム構築に向けた長期的な支援の必要性を紹介。JICA の指針と活動内容を発表する。
VI. 気候変動対策と資金に関するサイドイベント
⑧ Doha Climate Finace Series 共催機関：世界資源研究所（World Resource Institute） 概要：気候変動に関わる様々なファイナンス手法について、10 回のセッションを通じ、国際開発金融機関、二国間援助機関、民間金融機関、研究機関等の有識者間で広く意見交換を行う。

本調査においてJICAが開催したサイドイベント及び関係機関との会合の結果を以下に記す。

5.3.1.日本政府、ベトナム天然資源環境省（サイドイベント）

サイドイベント名	Viet Nam: Policy development, financial mechanism, technology transfer to respond to climate change
日　時	2012 年 11 月 26 日（月）13:15-14:45
場　所	Qatar National Convention Center
主　催	環境省、JICA、ベトナム天然資源環境省（MONRE）、GEC、OECC
テーマ	「ベトナムにおける政策・制度づくり、資金メカニズム、技術移転を通じた気候変動への取り組み」
目　的	日本政府をはじめとする各国のドナーからの支援を受けたベトナムにおける取り組みを、広く国際社会と共有する。
参加者	約 90 名

1. 概要

・開会挨拶

- ベトナム天然資源環境省 Ha 局長より、開催に際し、日本関係者への謝辞が述べられた。ベトナムは世界有数の気候変動脆弱国であり、将来的な海面上昇による甚大な被害が懸念されており、日本をはじめとする各国ドナーからの支援を通じ、これまでに様々な気候変動への対応策を立案、推進してきたことが説明された。特に、NAMA の策定においては、先進国の知識、知見なくして実現することは不可能なものであり、今後、ベトナムは、これらの経験を他の途上国と共有し、南南協力のモデルとして、他国の気候変動への対策にも貢献することを望んでいると述べた。
- 外務省堀江大使より、東アジア首脳会議参加国の地域協力の拡大を通じた低炭素成長を促進する取り組みとして「東アジア低炭素成長パートナーシップ」における日本の活動について紹介があった。同パートナーシップにおいては、低炭素成長を持続可能な経済成長を実現する鍵として位置づけ、各国の低炭素成長戦略策定支援における①資金、人的、知的資源の動員、②技術、市場メカニズムの活用、及び③ネットワーク作りを通じた知識と経験の共有を三つの柱としていることが説明された。また、同パートナーシップを通じたベトナム政府への支援の実績として、JICA の協力による省エネ法の策定や、それに伴うラベリング制度の構築が実現されたことが紹介された。さらに、具体的な緩和策として、ベトナム開発銀行を通じた中・長期的なツーステップローンの供与を通じ、製鉄、セメント、及び食品加工等の高排出産業の省エネ施策への有償資金の供与や技術支援を行っていることが紹介された。

・ベトナムの気候変動への取り組みについて

- ベトナム天然資源環境省 Hieu 博士より、2008 年に承認された気候変動に関する国家ターゲットプログラム(NTP-RCC)について紹介があった。同プログラムでは、ベトナム政府が取り組むべき優先順位の高い課題の解決を目的とし、各セクターや地域別の気候変動の影響を評価し、実現可能なセクター別行動計画を制定し、効果的に気候変動に対応することを目指している。
- ベトナム天然資源環境省 Minh 博士より、NTP-RCC の具体的な実施策である気候変動支援対策プログラム（SP-RCC）について説明があった。SP-RCC においては、天然資源環境局がプログラムの主管官庁となり、関係各省、地方政府、ドナー、市民社会、及び民間セクターを包括的に取り込んだ政策対話を重視した気候変動対策が推進されていることや、これまでに 120 以上の政策アクションの実施が図られていることが紹介された。また、発表後には、JICA が作成に協力した SP-RCC のビデオが上映され、参加者にとり、プログラムの内容をより具体的に理解するのに役立った。

・日本の支援を通じた NAMA の策定について

- ベトナム天然環境資源省 Huong 博士及び OECC の加藤氏より、日本の支援を通じて策定された廃棄物処理分野における NAMA の概要について紹介があった。また、将来的な課題として、ベースラインデータの精度の向上、プロジェクトレベル及び政策レベルにおける具体的な MRV（測定・報告・検証）制度の構築が挙げられた。
- GEC の白石事務局長より、日本政府が提唱する二国間クレジットメカニズム（JCM）について紹介された。CDM を補完するスキームとして、JCM には、低炭素技術の移転推進、ホスト国との共同による MRV 開発を通じた NAMA の推進、及び 2012 年以降の日本政府の排出削減目標達成への貢献等の目的があることが説明された。

・閉会挨拶

環境省谷津審議官より、サイドイベントを通じ、ベトナム政府による様々な気候変動への取り組みや、日本政府による具体的な支援の内容について参加者の理解が深まったことを評価するコメントがあった。また、こうした取り組みが、今後より一層発展していくことを祈念すると述べた。

2. 質疑応答

Q（英 AEA Technology の Christopher 氏）： NAMA 策定に関し、プロジェクトベースでの実施においても、ドナー側の MRV の要求に配慮していることを評価する。
A（OECC 加藤氏）：同様の取り組みをインドネシア、モンゴル、ラオス等の国でも展開しており、これらの経験は、ベトナムにおける NAMA の策定にも役立てられている。
Q （英 AEA Technology の Christopher 氏）： ベトナムにおける気候変動の二大ドナー（JICA、仏 AFD）以外の支援状況について。
A：英国 DFID からのキャパシティ・ビルディングが実施されている。
Q (コロンビアの Center for Sustainable Development Study の参加者)：日本政府の取り組み、ホスト国の NGO や民間セクターとの直接関わりの有無について。
A：JCM の FS 調査等においては、ベトナムの民間企業が直接のカウンターパートとなっている。
Q (日本の PEAR カーボンオフセットの松尾氏)：NAMA 策定における MRV 構築において、検証（V）の整備が重要となる。
A (ベトナム政府)：MRV の実施については当面プロジェクトベースで進め、今後、IPCC や国連等が発表する具体的なガイダンスに沿い構築していきたい。
Q (発言者不明)：廃棄物分野の NAMA 策定において埋め立てガス回収が対象となっているが､将来的に、養豚場のバイオガス回収の NAMA 策定ポテンシャルはどうか。
A：バイオガス回収も非常に大きなポテンシャルである。

3. 所感・特記事項

COP18 開催初日であったにもかかわらず、サイドイベントには約 80 名が参加し、盛況であった。また、質疑応答においては、欧州からの参加者からの質問が殆どであり、関心の高さがうかがえた。このサイドイベントを通じ、ベトナム及び他の途上国の気候変動への取り組みが一層強化されることが期待される。

5.3.2.国連開発計画（UNDP）（サイドイベント）

サイドイベント名	Enabling Environment for Catalyzing Private Sector Climate Finance
日　時	2012 年 11 月 28 日（水）13:15-14:45
場　所	Qatar National Convention Center
主　催	国連開発計画（UNDP）、世界銀行、国際金融公社（IFC）
テーマ	「民間資金を気候変動に動員するための環境構築」
目　的	公的資金のみならず､民間の資金を気候変動に呼び込むために必要な環境づくりについて議論する。
参加者	約 100 名

1. 概要
- 国際金融公社（IFC）シニアマネージャーの Vipul Bhagat 氏より、PPP（官民パートナーシップ）や部分信用保証 (Partial Credit Guarantee) 等のリスク管理スキームの経験から学んだ教訓について、IFC がインド・グジャラートにおいて支援した太陽光発電事業の事例をもとに紹介があった。 - 国連開発計画（UNDP）エネルギー・インフラ・交通・技術局長のMarcel Alers氏は、2012 年 10 月に出版された報告書「Transforming On-Grid Renewable Energy Markets2」を紹介した。本書は、限られた公的資金をいかに活用し、多額の民間資金を再生可能エネルギー投資に呼び込むことが可能となるかを分析したものである。さらに、市場改革におけるUNDPの手法に触れ、地球環境ファシリティ（GEF）が支援したUruguay Wind Energy Programmeから得られた成果について紹介した。GEFは同事業を通じて、ウルグアイの電力セクターに民間投資を呼び込むための環境構築も支援している。 - ウルグアイの SEG Ingenieria の Fernando Schaich 氏からは、省エネを専門とした ESCO 事業会社として発足した同社が GEF の Uruguay Wind Energy Programme により整備された投資環境にあやかり、いかにして再生可能エネルギー（風力）市場に参入していったかが発表された。同社はウルグアイ政府の入札において約 150MW の風力発電事業の利権を獲得しており、これらの殆どにおいて、欧州の大手風力発電事業者との提携により事業を推進しているという。同氏は、これまでの経験に基づき、新規市場への参入の成功の鍵となる重要な要素をとりまとめ、ウルグアイ政府への提言として提出済みであるという。
2. 質疑応答
ウルグアイ環境局が、Uruguay Wind Energy Programme の詳細を補足説明した。また、市場の変革策としての Feed in Tariff (固定価格買取制度)や電力販売価格の入札制度のプラス面とマイナス面について議論が交わされた。
3. 所感・特記事項
約 100 名が参加し、非常に盛況であった。

5.3.3.フィリピン政府気候変動コミッション（サイドイベント）

サイドイベント名	Best Practices On Enabling Communities To Mitigate & Adapt To Climate Change in the Philippines
日　時	2012 年 11 月 28 日（水）18:30-20:00
場　所	Qatar National Convention Center
主　催	フィリピン政府 気候変動コミッション、Ateneo de Manila University (ADMU)
テーマ	フィリピンにおけるコミュニティレベルでの気候変動緩和･適応への取り組みのベストプラクティス
目　的	フィリピン政府は国家気候変動計画の地方レベルでの主流化に着手。コ

[2] http://web.undp.org/gef/document/UNDP_FIT_Port_TransformingREMarkets_15oct2012.pdf

	ミュニティレベルでの生態系を考慮した管理手法を使った緩和･適応への取り組みと適応への支援活動を紹介する。
参加者	約 50 名

1. 概要

- Joyceline Goco 氏（気候変動コミッション事務局次長）がフィリピンのコミュニティでの気候変動への取り組みについて概要を紹介した。同国では 2011～2028 年を対象にした気候変動アクションプランを策定しており、食糧、水、環境・生物多様性、人間の安全保障、環境にやさしい産業・サービス、持続可能なエネルギー、キャパシティ・ビルディングの 7 項目を優先分野としている。地方レベルでの取り組みについては、気候変動法（2009 年、9729 号法令）にて気候変動行動計画の策定と実施に関する自治体の役割の重要性について、Peoples Survival Fund（2012 年、10174 号法令）にて地方レベルの適応活動への資金援助についてそれぞれ規定している。
- Antonio G.M. La Viña 氏（Ateneo School of Government 学部長）より、住民参加型の気候変動への適応と災害リスクの低減を地域の開発計画に取り入れるための取り組みを紹介。地域のニーズを踏まえた政策策定を行う事例として、予算の確保、再生可能エネルギー等の低炭素エネルギーへのシフト、環境保全型雇用の創出などを目指している。
- Mary Ann Lucille L. Sering 氏（気候変動コミッション副議長）が、成功事例としてエコタウンの枠組みを紹介。1）天然資源のアセスメント（GIS によるマッピング。魚の乱獲、マングローブの伐採など地域の実情を反映）、2）脆弱性評価、3）環境天然資源アカウンティング（森林、水資源、農業などにつき、収入と環境負荷の算定）4）コミュニティベースの適応策の策定、5）適応サポートサービス（マングローブの伐採や魚の乱獲を防止するためのインセンティブ付与）、6）ファイナンススキームの確立、のステップからなる。住民の気候変動対応への意識改革、科学の知見の政策への反映、長期・広域を視野に入れた政策策定、自治体をすべてのプロセスに関与させて能力強化を図ること等の重要性が共有された。予算は ADB、GGGI など複数の支援を受けているとのこと。
- 閉会に向けて、Bebet Gozun 氏（大統領補佐官（気候変動））と Heherson Alvarez 氏（気候変動コミッション理事）がスピーチを行い、災害リスク管理を適応策として実施すること、継続的な対策の必要性についてそれぞれ言及した。

2. 質疑応答

Q（KFW）: 他国においてコミュニティレベルの取り組みを行うために必要なことは何か。
A : フィリピンでは台風が多く、住民が気候変動に目を向け、自治体の限られた資源を有効活用する必要性を考える機会となった。
Q : エコタウンは都会でも実施できるか。
A : 本事業は地方を対象としている。将来的に人口の約半数が都会に流入することが予想されており、地方の脆弱性を悪化させる恐れがある。科学的なデータを背景に住民に脆弱性を理解させ、具体的な活動に落とし込むことが重要だと考えている。
Q : どのくらいの自治体がエコタウンを実施しているか。
A : エコタウンはパイロット事業であり、11 の自治体で実施している。マリキナ市は ADB の支援による。
Q : エコタウンにおいて民間セクターの役割は？
A : 一例として、漁業関係のマイクロファイナンスがある。貧困ラインよりも若干所得の

多い層を対象としている。
3. 所感・特記事項
フィリピンの気候変動対策（特に適応策）に注力していることを強くアピールする意欲が感じられた。

5.3.4.世界資源研究所(WRI)（サイドイベント）

サイドイベント名	Doha Climate Finance Series
日　時	①　2012 年 11 月 29 日（木）19 :00-22 :00
場　所	Sheraton Hotel
主　催	世界資源研究所(WRI)
テーマ	Scaling up climate finance – Financing models and financial instruments
目　的	気候変動に関わる様々なファイナンス手法について、国際開発金融機関、二国間援助機関、民間金融機関、研究機関等の有識者が意見交換を行う。
参加者	27 名（JICA 稲田前副室長、川村、三菱 UFJ モルガン・スタンレー証券縫部）
概要	
気候変動に関わる様々なファイナンス手法について、テーブルごと（各テーブル 8-9 名、3 テーブル）に議論が行われた。主なトピックと討議内容は以下のとおり。 - 2013 年以降における緑の気候基金を通じた年間 1000 億ドルの資金をどのように確保していくかは、喫緊の課題となっている。参加者はこれまでのファイナンスにおける経験を共有し、将来の画期的なファイナンス手法の在り方を議論した。 - アジア開発銀行の参加者より、同行では 2008 年より気候変動基金を立ち上げ、気候変動を対象としたプロジェクトへの融資を行っているとの紹介があった。マレーシアのように卒業国であっても、気候変動関連の支援を引き続き必要としており、融資を受けることを検討している状況があり、気候変動資金のニーズがより一層高くなることが想定されるとコメントがあった。また、融資の実行においては「結果ベース（result based lending）」のアプローチをとり、資金の供与を段階的にし、それぞれのフェーズにおいて事業の進捗を確認し、資金を流すスキームを取り入れているという。 - DIFID の参加者からは、CP3 (Climate Public Private Partnership)を通じた気候変動への支援を行っていることが紹介された。CP3 は採算性のあるクリーンプロジェクトを対象とし、ペンションファンドや政府系ファンドなどの新しい資金を取り込む新しいファイナンス手法の構築を目的としている。 - 三菱 UFJ モルガン・スタンレー証券からは、ベトナムにおける ESCO(エネルギーサービス会社)事業の立ち上げを通じた支援について紹介した。	
日　時	②　2012 年 11 月 30 日（木）19 :00-22 :00
場　所	Sheraton Hotel
主　催	世界資源研究所(WRI)

テーマ	Scaling up climate finance – Financing models and financial instruments
目　的	気候変動に関わる様々なファイナンス手法について、国際開発金融機関、二国間援助機関、民間金融機関、研究機関等の有識者間で広く意見交換を行う。
参加者	約 20 名（JICA 稲田前副室長、川村、三菱 UFJ モルガン・スタンレー証券　縫部）
概要	
気候変動への投資においての国内外の金融機関の果たす役割について、テーブルごと（各テーブル 5-6 名、3 テーブル）に議論が行われた。主なトピックと討議内容は以下のとおり。 - 2013 年以降における緑の気候基金においては、これまでのような多国間開発機関を通じた事業の実施と並行し、途上国内の実施機関(National Implementing Agency)による資金へのアクセスと事業の実施を可能とすることになっており、そこから新たに生じうる様々なリスクに対処するため、国際金融機関のみならず、国内における基金の受け入れ体制が整備されていることも課題となっている。 - EU 及びオランダ政府の参加者からは、早期資金を通じた実績の説明があった他、資金規模もプロジェクトスケールもより大きくなることが想定される長期資金においては、資金の活用に関わる各国の省庁横断的なキャパシティ・ビルディングが必要とコメントがあった。南米では、地場金融機関もそれなりの能力を備えており、必要に応じ技術的な支援をすれば、ダイレクトアクセスに十分対応できるレベルにあるという。 - 三菱 UFJ モルガン・スタンレー証券からは、数年前、東南アジアにおいて、CDM やクリーン技術に関する地場金融機関の知識が十分でなく、用意されている資金が活用されていない現状があった例を紹介した。地場の国営金融機関に対しキャパシティ・ビルディングを行った結果、同資金を活用した CDM 案件やクリーンプロジェクトの推進につながったことを説明した。 - 米州開発銀行からの参加者は、同銀行では、相手国政府への支援に加え、現地の民間企業への直接の融資も行っていることから、後者において、地場銀行の機会を奪うようなことにならぬよう、十分な配慮が必要と考えるとのコメントがあった。	

日　時	③　2012 年 12 月 1 日（土）18 :30-21 :30
場　所	Sheraton Hotel
主　催	世界資源研究所(WRI)
テーマ	Role of National and International Climate Funds and Institutions
目　的	適応策の資金導入をテーマに、二つのテーブルに分かれ、ディスカッションを行う。
参加者	約 20 名（JICA 稲田前副室長、川村）
概要	
主な議論の内容： 適応策の資金導入をテーマに、二つのテーブルに分かれ、ディスカッションが行われた。主なトピックと討議内容は下記の通り。 ①　適応策へのキャパシティを国家レベルで向上させるための方策	

多国間開発機関（MDB）では適応策のファイナンスをトラッキングする国際的な圧力が高まっており、各機関とも OECD/DAC の適応マーカーでのフラグ建てを行っているが、機関により適応策に位置づける方法論や定義が異なっており調和化した定義が必要であるとの意見があった。ガーナの参加者からは、適応策のための予算確保について財務省と他省との調整が重要との指摘があった。

② 適応策への民間資金の動員
インフラへの投資や保険などの機会があるものの、利益の確保が課題。環境税を徴収し、国家適応基金を設立して、資金を適応策のみに充てるという事例の紹介があった。

③ 国際的取り組み：GCF への期待
適応基金（Adaptation Fund）は CER を原資としており、予算規模が減少している。GCF 設立により、適応策への資金額の増大、基金の透明性・効率性の向上、構造の簡素化への期待の声が聞かれた。

日　時	④　2012 年 12 月 4 日（火）19 :00-22 :30
場　所	Sheraton Hotel
主　催	世界資源研究所(WRI)
テーマ	The transparency and effectiveness of public climate finance
目　的	気候変動への資金がどのように費やされたのか、より良い情報提供の必要性、また、支援の透明性を増進される必要についてディスカッションを行う。
参加者	約 30 名（三菱 UFJ モルガン・スタンレー証券　吉高）

概要

主な議論の内容：
気候変動への支援がどのように費やされたのか、より良い情報提供の必要性が認識されている。また、気候変動への支援の透明性を増進させることは、UNFCCC の義務を果たすための相互説明責任を促すことでもある。テーブルごと（各テーブル 9-10 名、3 テーブル）に議論が行われた。主なトピックと討議内容は以下のとおり。

① Post-fast-start 期間における公的機関へのレポーティングをいかに向上することが出来るか。UNFCCC の制度の内外においてどのような機会が提示されうるか。

② 緩和と適応のバランスをとること、脆弱な国々に対する支援をより確実なものとすること、プレッジした目標を達成するためにいかに公的資金の提供をより高い目標に設定しうるか、また、FSF の実施から学んだ経験は何か。

③ 通常の開発プロジェクトや社会資本資金の提供と比較し、気候変動への支援は特筆すべき効率性があるのか。

④ 組織、キャパシティ、基本的なインセンティブのフレームワークの強化等を追及する資金提供の効率性をいかに増強させることができるか。

- 冒頭に行われた参加者同士の自己紹介より、多くの人が透明性の確保を重要視してい

ることが示されている中、Jan Corfee-Morlot（Environment Climate Change and Development のチームリーダー）より資金の使途に関するレポーティングは実際に可能であるのか、という問題が提起された。尚、Corfee-Morlot は、同日午後 OECD 主催のイベントで、先進国から途上国への Climate Financing について講演している。
- IGES が日本の FSF の評価調査を実施した際、日本政府が FSF の資金活用の詳細を公開しないため、調査が困難であったことを指摘した。特に、緩和と適応のバランスに関して明確にすることが出来ない。
- WRI の適応の担当からは、緩和に資金が多く流れている傾向があるが、公的資金は適応に重心を置くべきであるという意見があった。これに対し、GIZ の気候変動担当は、低炭素社会開発、気候変動の抑制は緩和が中心でありそのリスクは評価し易く、適応に重きをおくというよりは、並行して資金を提供すべきである、との意見があった。
- ADB 気候変動プログラムコーディネーションユニットの専門家より、途上国側にドナーのレポートとのマッチングができるかという問題があるとの指摘があった。当社より、途上国にはそれぞれの国の優先分野があり、ある東南アジアの財務省は、海外からの資金供与に関して、「気候変動」という名称でローンなどを受けることに理解が得らない場合があり、簡単ではないとコメントがあった。
- GIZ も、はっきりと分類ができない状況もあるので、性善説では判断ができないため、レポートについては積極的でない、と同調が示された。UNEP の再生可能エネルギープログラムの担当者もこの意見に同意した。これらの議論の中で共通の問題意識は、緩和と適応の資金の定義が明確でないことである。効率性を強化するためには、情報の共有とコミュニケーションをすることが最も重要であることは全員で同意した。
- IGES より、藤原氏、明日香氏、清水氏の 3 名が参加していた。

日　時	⑤　2012 年 12 月 6 日（木）20 :00-22 :30
場　所	Sheraton Hotel
主　催	世界資源研究所(WRI)
テーマ	High-level session: Raising ambition on climate finance – messages from Doha Climate Finance Series
目　的	WRI サイドイベントシリーズ最終日のハイレベルセッションとして、複数の緑の気候基金（GCF）のボードメンバーや金融機関（Bank of America、IFC）、先進国・途上国政府等の参加により、適応策の資金導入をテーマについて議論する。
参加者	約 20 名（JICA 佐原副室長、川村）

概要

主な議論の内容：
- 民間資金動員の要因として、化石燃料価格の上昇により、再生可能エネルギーへの投資が増加することへの期待、資金調達方法として年金基金の運用・投資や環境税の導入の可能性が議論された。
- JICA は、途上国政府内における気候変動対策の主流化が必要であること、その支援のために ODA を途上国との対話を重ねて効果的に活用することが重要であることを指摘した。

5.3.5.低炭素開発戦略グローバルパートナーシップ（関係機関会合）

会合名	Low Emission Development Strategies (LEDS) Global Partnership Steering Committee
日　時	2012 年 11 月 30 日（木）20:30-22:30
場　所	Sheraton Hotel
主　催	Low Emission Development Strategies (LEDS) Global Partnership Steering Committee
テーマ	低炭素開発戦略グローバルパートナーシップ
目　的	コスタリカ Steering Committee 会合の報告

1. 概要

- 事務局を務める米 National Renewable Energy Laboratory の Ron Benioff 氏から、今後のパートナーシップ活動の方向性について、コスタリカ会合で議論された主要な点の説明があった。

  1) 途上国における優先事項を同定して、Regional platform を設定する取り組みを行ってきた。今後の Regional platform の発展のため、以下のようなＷＧ設置の提案がなされた。

  ① 分析：優先事項を同定する。
  ② ファイナンス：各国の優先事項を実施するための資金について検討する。
  ③ ファシリティ:同定された活動事項に関して、どのような機能が必要か検討する。

  2) 本パートナーシップは、現在、低炭素・排出削減活動のみを対象にしている。しかし、途上国からは、適応・Climate resilience についても対象にするよう、意見が出ている。これに伴い、対象にするか否か、対象にする場合は低炭素・排出削減活動とのバランスをどうするか、パートナーシップの名称をどうするか等の点が議論されたが、意見の一致はみなかった。

- 本イベントでは特段結論はとりまとめられなかったが、途上国の参加者からは、似たような境遇にある国々が集まる Regional platform の方が、Global level での議論よりも参考になるなどの意見が出された。先進国の参加者からは、①アフリカ、アジア、中南米と途上国にのみ低炭素化を求める構造となっているが、欧州や北米についても同じような Regional platform が必要ではないか、②適応・climate resilience について、各ドナーの方針（例えば USAID は緩和と適応の予算項目を別にして議会に提出しており、緩和のパートナーシップで適応もカバーできるとなると、適応の予算項目に影響する）を踏まえなければならない、③緩和の対象となっているセクターの検討を行う際、これらのセクターにおける適応・climate resilience を検討してもよいのではないか、などの意見が出された。
- パートナーシップの設立を主導したこともあり、英米関係機関の意見が強く反映される傾向がみられるが、アジア地域の活動は日本政府が推進する「東アジア低炭素成長パートナーシップ」との接点も少なくないところ、引き続き Steering Committee のメンバーに入り情報収集を行うことが妥当と考えられる。

5.3.6.早期資金 (Fast Start Finance)（サイドイベント）

サイドイベント名	① Fast-start Finance information Event ② Enabling Environment for Catalysing Private Sector Climate Finance ③ US. Climate Finance 2010-2012: Meeting the Fast Start Commitment ④ Measuring and trackin climate progress
日　時	①11 月 27 日（火）、②11 月 28 日（水）、③11 月 29 日（木）、④11 月 30 日（金）
場　所	Qatar National Convention Center
主　催	①UNFCCC、② EU、③ US government、④ World Resource Institute
テーマ	早期資金 (Fast Start Finance)
目　的	早期資金 (Fast Start Finance)の成果に関する報告、今後の長期資金への課題の共有。
参加者	①200 名程度、②20 名程度、③30 名程度、④100 名程度

1. 概要

- UNFCCC サイドイベントにおいては、早期資金の実行の最後の年である現在までの資金供与状況、内容、及び将来的な課題について、9 か国の代表が発表した。また、コペンハーゲン及びカンクン合意において、早期資金（FSF）は「新規且つ追加的」であるとされており、各国共に、これが順守されていることを強調した。さらに、各国代表は、プレッジの殆どが実行済みであることを報告し、今後、2020 年までの長期資金目標の実現に向けた貢献の用意があることを示した。
- EU 及び米国政府のサイドイベントにおいては、両国がそれぞれの取り組みをさらに詳しく紹介する場となった。
- UNFCCC、EU、及び米国政府のサイドイベントを通じた各国の主な主張・コメントは以下のとおり。

  - オーストラリア
    - 効果的で透明性のある緩和活動の実現のために、資金源の多様化、特に民間資金の投入が重要である。
    - 民間資金の流入において、途上国内の政策、制度の役割が不可欠であること、長期資金は早期資金の経験を踏まえた、スケールアップしたものとなることが期待される。
  - カナダ
    - 長期資金の実行において、グローバルな政策整備が重要。透明性と効果を備えたアプローチは、資金を呼び込み、結果につながる。
  - EU
    - 途上国への支援は EU の重要なミッションである。
    - 先進国の資金を活用した途上国によるアクションは途上国の主導で取られ、途上国の国家政策の整備が気候変動ファイナンスの促進の鍵となる。国家開発計画とのリンクが重要。

- ✧ 長期資金の実行において、一層の援助協調と包括的なフレームワークの整備が不可欠である。民間資金が流れることが期待され、革新的なファイナンススキームの創出が望まれる。
- ✧ 2013 年以降も気候変動ファイナンスの供与を継続する用意がある。

➢ 米国
- ✧ 早期資金供与における重点項目は、適応、クリーンエネルギー、及び持続可能な森林管理分野。
- ✧ 長期資金においては、重点分野を拡大し、2020 年までの 1000 億ドルの目標に向け、引き続き支援を続ける用意がある。

➢ スイス
- ✧ 2020 年までの長期資金において、どの国がどれだけ拠出し、誰が資金の受け手となるのか、既存のチャネルを活用した資金配分がなされるのかが重要。
- ✧ 早期資金においては民間セクターの関与が十分でなく、着手にも時間がかったものの、全体として成功だったと評価する。

➢ ノルウェー
- ✧ 各国からの早期資金の供与は新規かつ追加的で、ODA 資金の低減にはならなかったことを評価する。

➢ ニュージーランド
- ✧ 長期資金の実現においても、早期資金の実績と同レベルの資金を、再生可能エネルギー及び気候変動の対応能力構築等に供与していきたいとの発言があった。

➢ リヒテンシュタイン
- ✧ 2013-2015 の新たな 3 年間においても、資金供与の用意がある。
- ✧ 長期資金の成功には一層の民間資金の動員が望まれる。
- ✧ 民間セクターとのパートナーシップを通じた知識の共有が、先進国のコミットメント達成に不可欠。

➢ 日本
- ✧ 長期資金においても、支援継続の用意ができている。

➢ ドイツ
- ✧ FSF の資金は EU-ETS の排出権オークションの収入（2008～2012 年で 6 億ユーロ）を充てたもので、新規且つ追加的である。

➢ フランス
- ✧ 2012-2016 年の戦略的開発計画において、AFD は年間のグラントの 50%を気候プロジェクトに充てる（30%は民間向け補助金 Proparco）。多国間支援では GEF に 2013-2014 に 8,600 万ユーロを拠出する予定がある。
- ✧ 金融取引税（financial transaction tax）の 10%を現行の気候変動をはじめとした開発支援に充てる予定。

- WRI によるサイドイベントでは、Open Climate Network（OCN）を通じた各国の気候変動政策、実施状況の分析・比較方法が紹介された。気候変動政策のトラッキングの実施の重要な目的として、過去の実績から学ぶべきことを共有し、新たな取り組みに役立てることと、政策の実行における透明性の確保の二点が示された。また、OCN のフォーカル分野として、ファイナンスアセスメント、クリーンエネルギー経済、及

び政策評価の三つのモジュールが設けられており、政策評価に関し、新たに 3 か国のワーキングペーパーが発表されたことが報告された。さらに、ケーススタディとして米国を取り上げ、国をあげた様々な取り組みにより、エネルギー利用からの二酸化炭素排出は減少に向かっているものの、二酸化炭素以外のガスの排出が増加傾向にあること、昨今の燃費基準の導入により交通セクターの排出削減が飛躍的に進んでいることを評価し、他のセクターがそれに追随することが期待されることが強調された。この点については、近々出版予定の「Reducing GHG Emissions in the US Using existing federal authorizes and state action」に紹介されているとのこと。

2. 質疑応答

- UNFCCC サイドイベント

Q (NGO の参加者)： 実際に必要な資金はどのぐらいなのか。気候変動ファイナンスの資金は新規で追加的である必要があるのか。

Q (バングラデシュの参加者)：早期資金の実施状況に関し、いずれの政府代表の報告も良い実績が出ているとのポジティブなものばかりであるものの、研究機関やシビルソサエティの分析結果は必ずしもそのとおりではない。

Q (ウガンダの参加者)：気候変動ファイナンスの供与における各国のクライテリア（プロジェクト選定基準等）についてより具体的にして欲しい。当初の目的が達成されたかどうか、どのようなに評価するのか、その手法を示して欲しい。

Q (アフリカの参加者)：これまで供与されてきた気候変動ファイナンスの殆どが公的資金である。1,000 億ドルの調達に向け、どのように民間セクターを動員していくのか。

A：質疑応答に関して時間切れの状況があり、米国政府代表より、1,000 億ドルの資金に関しては民間セクターの参加無しに達成することは難しいとコメント。また、ノルウェー政府代表から、適応資金の多くは公的資金の活用が一般的であるが、各途上国と個別に議論を進め、適応分野での民間資金の動員方法を模索する必要があるとコメント。また、民間資金の投入にあたっては、要件等の基準を明確に定めることも重要であると述べた。

- 米国政府サイドイベント

Q（グリーンピース）：米国における化石燃料向け補助金の額は増加しており、早期資金に供与された額の 4 倍以上になっている。これらの資金の一部を今後の支援に振り向けるような話はあるのか。

A（米国政府）：米国におけるクリーンエネルギー投資額も増加している。クリーンエネルギー投資の予算は化石燃料補助金や原子力の開発予算から付け替えることはできない。

Q（ウガンダ政府）：資金の分野別の使途に関するスライドで、森林関連の投資、及び地球環境ファシリティ、LDC 基金への拠出額が減っているグラフが示されているが、減少した要因は何か。

A（米国政府）：優先順位づけにより、一部の基金への拠出が増減している。森林関係の

減少は具体的なプロジェクトがなかったことによる。
Q（質問者不明）：資金のビジビリティが重要と考える。米国ではどのような取り組みを行っているか。特に民間資金に関する情報提供はどうなっているか。
A（米国政府）：公的資金に関しては、オランダのイニシアティブにより開設されている FSF ウェブサイトや隔年報告書を通じて UNFCCC への定期的な報告を行っている。2013 年 5 月に FSF 最終報告書を提出する予定である。民間資金に関しては OECD が資金フローを追跡するデータベースの構築を進めている。
A（メキシコ政府代表者）：各国ごとの取り組みの進展は理解できたが、各国間のコーディネーション（援助協調）にはさらなる努力が必要と思われる。資金の有効活用、情報共有を期待する。

- WRI サイドイベント

Q（インドの参加者）：国内における政府の様々な政策の関係についての分析も行うことを提案する。例えば、政府による石炭の輸入政策が石炭の価格を引き下げ、結果として石炭消費の増加を引き起こす、など懸念がある。
Q（質問者不明）：各国の気候変動政策、実施状況の分析・比較において、コベネフィットの要素は考慮されているか。
A: 産業界の取り組みにおいてコベネフィット要素を考慮するのは簡単ではないが、分析モジュールの一つにコベネフィットがある。

3. 特記事項

本サイドイベントで収集した情報をもとに、主要国の早期資金（FSF）実施状況を一覧表にとりまとめた（添付 11）。

5.3.7.国際赤十字赤新月社連盟気候センター（サイドイベント）

サイドイベント名	Development and Climate & Adaptation Practitioners Days
日　時	2012 年 12 月 1 日（土）、12 月 2 日（日）
場　所	EdzanHotel
主　催	国際赤十字赤新月社連盟気候センター
テーマ	「気候変動に対応した開発(Climate-smart Development)のための革新的なアプローチと対話の構築」
目　的	気候変動に脆弱な途上国における、国やコミュニティレベルでの適応策に関し、世界各国の研究機関、実務機関が一同に会し、意見交換を行う。
参加者	ワークショップ約 80 名、パネルディスカッション約 40 名

1. 概要

- 本イベントは、国際赤十字赤新月社連盟気候センターが JICA の支援を受け開催したものである。途上国開発と気候変動適応に関する対話の推進を目的とし、途上国の気候変動交渉官から先進国の NGO 代表まで 80 名余りの幅広い参加者が活発な議論を

交わした。

- 具体的には、参加型ゲームの手法が取り入れられ、テーマごとのグループディスカッションを経て、適応策に関する投資決定が及ぼす影響等を参加者が身を以て考える場となった。
- JICA は適応分野における取り組みを紹介し、本会合に期待する成果として、途上国による既存の適応戦略やドナーの適応政策における気候科学の活用、脆弱性の評価や適応計画の策定の改善に向けたフィードバックがなされることを挙げた。
- サイドイベントの合間には、マーケットプレイスと称した参加者同士のインフォーマルな自己紹介の機会も設けられ、参加者にとり貴重なネットワーキングの場にもなった。
- 最終日には、国家レベルの適応への資金供与のあり方を議論するハイレベルパネルが開催され、Atiur Rahman バングラデシュ中央銀行総裁、Preety Bhandari アジア開発銀行気候変動プログラム調整ユニット主席気候変動専門官、Cristina Rumbaitis del Rio ロックフェラー財団副ディレクター、及び Timmons Roberts ブラウン大学教授らがパネリストとして登壇した。
- 各パネリストより適応分野における取り組みが紹介され、Atiur Rahman 総裁からは、バングラデシュ中央銀行の業務におけるペーパーレス化や、国内のすべての金融機関（公的、民間）に対するグリーンバンキング規制の導入や、銀行業における環境リスク管理のガイドライン策定等における取り組みが紹介された。また、中央銀行内に気候信託基金を設置し、気候変動対策に関わる事業やプロジェクトへの融資資金が確保されているとの説明があった。
- Preety Bhandari アジア開発銀行主席気候変動専門官からは、同氏の過去数十年における途上国への投資や資金フローの分野での経験通じ、適応活動へのファイナンスの必要性を認識しており、緑の気候基金における適応資金の供与を歓迎するとのコメントがあった。また、アジア開発銀行では、セクター横断的な気候変動プログラム調整ユニットの設置により、同行の開発融資における気候変動の主流化に努めているとの話があった。
- Cristina Rumbaitis del Rio ロックフェラー財団副ディレクターからは、途上国の地方都市主導による気候変動対応能力構築を目的としたプログラムの紹介があった。地方都市における適応の重要なアクターとして市民社会を挙げ、資金の有効活用に向けた市民社会へのキャパシティ・ビルディングの必要性を述べた。
- さらに、Timmons Roberts ブラウン大学教授は、適応分野への資金活用に関するこれまでの研究活動の経験から、資金の使途の明確化、資金の出し手と受け手の信頼関係の構築が重要であることを強調した。さらに、援助資金のトラッキングを行うためのデータベースの整備と活用も信頼関係構築の一助となると述べた。また、先進国と途上国の研究機関同士の人材交流や共同研究等を通じ、学術界による適応活動へのより一層の貢献に努めたいとコメントした。

・閉会挨拶

閉会にあたり、赤十字気候変動センターの Maarteen van Aalst 氏より JICA をはじめとする協力機関に対し謝辞が述べられ、二日間のサイドイベントから参加者一人一人が何かを学び取り、今後の適応活動の推進に役立てられることを祈念すると述べた。

2. 質疑応答
Q（質問者不明）：IEA 等の報告において、民間資金の 9 割が緩和活動に流れているといわれているが、緩和と適応のバランスをとるには何が必要であるか。民間セクターの活用はいかに実現可能か。 A：（バングラデシュ中央銀行）バングラデシュ中央銀行では、ADB より供与された 5 千万ドルの資金を活用し、民間地場銀行を通じ、気候変動に関わる新規事業の立ち上げを行おうとする個人企業家に対し融資しており、すでに、民間セクターの活用を推進している。 (ロックフェラー財団) ファンドに投資している民間企業は、必ずしも投資収益を期待しているわけではない。ファンドの目的に理解を示し、出資を行っている。 （アジア開発銀行）アジア開発銀行では、民間セクター担当部局内に PPP ファンドの立ち上げ準備をしており、この機会を生かし、民間セクターの関与拡大を図りたい。
3. 所感・特記事項
週末であったにもかかわらず、サイドイベントには両日ともに世界各国から多くの参加者が集まり活発な議論が交わされた。同イベントは今回で 10 回目を迎え、今後も引き続き参加者にとり、有意義な議論と対話の場を提供することが期待される。

5.3.8.地球環境ファシリティ(GEF)（サイドイベント）

サイドイベント名	Climate Technology and Finance
日　時	2012 年 12 月 3 日（月）13:15-14:45
場　所	Qatar National Convention Center
主　催	地球環境ファシリティ（GEF）、アジア開発銀行（ADB）
テーマ	「技術移転とファイナンス」
目　的	気候関連技術移転とファイナンシングに関する既存のイニシアティブにフォーカスを当て、開発銀行の役割、民間セクターが係わる技術移転を機能させた経験を共有し、効率的な公的資金を活用について議論する。
参加者	100 名程度

1. 概要

- 地球環境ファシリティ(GEF)CEO の石井菜穂子氏から、これまでのＧＥＦの技術移転に関する取り組みの歴史について、とくに、COP14（ポズナン）で合意された技術移転に関する戦略的プログラムは、途上国において環境技術と環境管理プラクティスへ投資を動員することに注力していることが述べられた。技術移転には、特に民間の資金が重要であるが、そのためにはいかに市場の外部不経済を、内在化するための具体化策が必要とされていると強調した。
- アジア開発銀行(ADB)副総裁の Bindu Lohani 氏は、アジアにおける気候変動対策には技術へのアクセスがキーであることを強調し、今後の開発成長、社会資本投資は低炭素開発を進むであろうと述べた。しかしながら、これらには新たな資本が必要であり、そのためには、GEF、ADB、UNEP の新たな協働関係が必要であり、技術移転の促進、GHG 削減技術市場の確立を図ることを強調した。

- アジア開発銀行(ADB)気候アドバイザーの Lu Xuedu 氏は、同行の「Pilot low carbon technology marketplace」の設立についてプレゼンをした。これは気候技術への投資を資金調達に組み込むものである。
- アフリカ開発銀行気候変動専門官の Mafalda Duarte 氏は、アフリカでの問題は他のエリアと違い、技術に対する知識が低いことをあげ、まずこのギャップを埋めることの重要性を強調した。また、緩和よりも、生産性を上げるための技術、適応への技術が必要であるとした。
- 米州開発銀行（IDB）上級気候変動専門官の Claudio Alatorre 氏は、中南米では、再生可能エネルギー、エネルギー効率向上などの緩和の技術も重要だが、植林、森林管理に対するモニタリングの技術は同地域にとって必要であること述べた。
- 欧州復興開発銀行（EBRD）シニアマネージャーの Craig Davies 氏は民間にはとれない、リスクの低い新技術の採用や、投資バリアを緩和するファイナンスを組むことが公的資金の重要な役割と述べた。
- 日本の環境省の谷津地球環境審議官は、日本は民間資金導入のためいくつかのプログラムを実施していることに触れ、BOCM（二国間オフセットクレジット制度）について説明した。クレディースイスは 250 百万ドルの気候変動に関するファンドについて触れ、公的機関は民間の資金導入のためにリスク緩和の支援をすべきことを強調した。そのほか、ロシアの民間での取り組みと UNIDO の支援が紹介された。
- 最後に、世界銀行の Barton-Dock 氏と GEG の石井氏が技術移転と革新には、既存の技術の市場のスケールアップ、政策でのあとおし、現地開発銀行との連携、国際的な R&D での協力などの支援策を強化することに同意した。

2. 質疑応答

南アフリカのドナー機関から、技術のマッチングの重要性、緑の気候資金への期待等のコメントが寄せられた。

3. 特記事項

技術移転に関しては、公的資金の支援と、民間資金の動因の必要性について繰り返し述べられておりどの国際機関とも一致している。今回の COP18 で議論が紛糾した IPR（Intellectual Property Right）についてはあまり触れられておらず、民間資金動因に関してのさらなる施策が必要となると思われる。

5.3.9.経済協力開発機構（OECD）（サイドイベント）

サイドイベント名	Securing Climate Finance and investment to support Low-Carbon and Climate-Resilient Growth
日　時	2012 年 12 月 4 日（火）13:15-14:45
場　所	Qatar National Convention Center
主　催	経済協力開発機構（OECD）
テーマ	低炭素と気候弾性成長の支援のための気候ファイナンスと投資の確保
目　的	低炭素と気候への対応力のある(Climate-Resilient）経済に移行し、民間資金の動員を進めるために必要な効果的な政策について議論する。
参加者	150 名程度

1. 概要

- OECD の玉木林太郎事務局次長がモデレーターとなり、サイドイベントの目的とパネリストを紹介した。議論の主なテーマは、グリーン、低炭素、及び気候弾性のある経済に移行するため、いかに民間資金を動員するか、である。
- 英国の環境・持続可能開発省の審議官の Gregory Barker 氏から英国の取り組みについて紹介された。英国はいち早く気候変動税などを導入し、固定価格買取制度（FIT）の導入、エネルギーサービス（ESCO）事業の促進、革新を促進する政策、民間との協調投資などのスキームを進めてきた。また、今年英国が民間資金導入のために設定した Green Investment Bank についても今後進めていくことを強調した。
- コロンビアの交渉官である Adriana Soto 女史は、コロンビアにおける気候変動資金のプログラムについて説明した。特に、2012 年 11 月 30 日に発表された、英国が英国の国際気候変動ファンドから、コロンビアの森林、植林保護のために１５百万ボンド供与されることに触れ、コロンビア国内にあるファンドと合わせ、コロンビアは森林関連に力をいれていくとした。
- OECD 副ディレクターの Helen Mountford 氏は、OECD の気候変動行動のファイナンシングについて、低炭素、気候弾性経済、グリーン成長への円滑な移行を確実にするために気候ファイナンスの動員を促すために国内外における活動を支援しており、研究結果を発表した。民間の資金は 90%が緩和に関するインフラ資本であること、各先進国の資本注入などについて説明し、グリーンインフラ投資を支援するための国内ポリシーに 5 つの重要な要素（戦略的なゴール設定、低炭素成長のインセンティブ政策、財務政策とツール、低炭素経済のキャパビル、グリーンビジネスと消費者行動の促進）の重要性について述べた。
- OECD の Jan. Corfee-Morlot 氏は、主に国際機関の途上国側の低炭素支援活動について、日本が緩和および適応活動に対して最も貢献しており、緩和にはドイツが、適応には英国が貢献している。レシピアントのうち、緩和はインド、適応はインドネシアが最も多い。なお、ここで、玉木氏が日本の貢献については鳩山イニシアティブに基づいていることを強調した。
- 最後に Alston の Dickson 氏は、世界的なエンジニアリング会社である同社の気候変動に関するインフラプロジェクトへの投資の経験(エチオピア等)について話された。民間としては公的資金または政策に民間とリスクのシェアをしてもらえる施策をしてもらいたいと強調した。また、緑の気候資金についての提案として、以下の 3 点が挙げられたが、OECD からは、これらを組織化することは簡単ではないことが指摘された。

    1) エネルギー購買契約（PPA）の保険引受けを目的とした小規模なリザーブファンドの設置
    2) 債務の証券化(Securitization of debt)
    3) 年金基金（Pension）や福祉基金（Welfare fund）等の運用による元手資金の確保

2. 質疑応答

南アのドナー機関から、インフラ投資に偏ると政策リスクがあり、それをどのように偏在化させないようにするかが重要であるなどのコメントが寄せられた。また、民間のベンチャーの利用について質問があったが、ベンチャーキャピタルはグローバルな資金で

はないため利用に限界があると回答した。気候変動資金は、既存の気候関連資金の置き換えではなく、追加的な資金として導入されるべきという議論がされた。

3. 特記事項

多くのコメントが寄せられ関心の高さが伺えた。OECDのカーボンファイナンシングの研究については、財務省から出向されている川西氏より資料を入手した。同資料はOECDウェブサイトhttp://www.oecd.org/env/cc/financingclimatechangeaction.htmにも掲載されている。

5.3.10.UNFCCC（サイドイベント）

サイドイベント名	Joining efforts to support the preparation and implementation of NAMA: an international partnership
日　時	2012 年 12 月 5 日（月）13:15-14:45
場　所	Qatar National Convention Center
主　催	UNFCCC
テーマ	「途上国における適切な緩和行動（NAMA）に関する国際パートナーシップ」
目　的	国際機関が UNFCCC 事務局と協力してパートナーシップを立ち上げ、これまでの NAMA 支援事例を共有し、今後の活動の方向性について議論する。
参加者	80 名程度

1. 概要

サイドイベントは、途上国代表者（ケニア、メキシコ、ブータン）による自国の NAMA についての発表と先進国による NAMA 支援の取り組みの発表の二部で構成されていた。

・途上国による NAMA 実施について

- ケニア電力より、CFL（蛍光灯）の普及促進プログラムの紹介があった。同プログラムはケニア政府の独自の取り組みとして、2010 年に 125 万個の CFL 導入をパイロットベースで実施し、その後、アフリカ開発銀行、スタンダード銀行、及び Cool nrg International の支援により導入個数は 330 万にまで拡大した。プロジェクトの効果は、1,200 万トンの二酸化炭素削減と、1,800GWh の電力消費量削減をもたらし、1 億 5 千万ドルの節約につながったという。NAMA の実施においては、モニタリング及び報告の実施手段の整備や交換された白熱電球の廃棄問題（水銀）などが課題であったと述べた。
- メキシコ政府国家住宅評議会より、高効率住宅の普及を対象とする NAMA の紹介があった。メキシコでは 2006 年より高効率住宅の普及を目的とした Green Mortgage の取り組みがあり、優遇された住宅ローンの提供などを行っており、その成果（排出削減効果）等を分析し、住宅の性能のラベリング制度の構築や、CDM プロジェクトも推進している。NAMA については、一定の基準を満たす新規の住宅を対象としたものと、既存の 1,300 万軒の住宅改修（高効率化）も対象となっている。ドイツの GIZ が NAMA 計画策定、ラベリングシステムの構築の支援及び、当初 75 軒の省エネ住宅に対する資金供与を行った。

- ブータン国家環境評議会より、NAMA への期待についての発表があった。同国ではまだ具体的な NAMA の策定は進められていないが、UNDP-LECB の支援を受け、NAMA 策定に向けた取り組みが進められている。NAMA により期待する便益として、プロジェクト実施地域のみならず、世界全体の環境にもたらすコベネフィット効果、技術移転、及び資金の動員が挙げられた。ポテンシャル分野としては、住宅及び交通セクターである。
- グレナダ財務・計画・経済・エネルギー・協力省より、特に、貧困削減、エネルギーコスト削減、省エネ事業への投資、及び低所得者の住宅改修等の分野において、NAMA の策定・実施を通じ、先進国とのパートナーシップを期待するとのコメントがあった。

・先進国による NAMA 支援について
- JICA の佐原副室長より「二国間開発金融機関の気候変動ワーキンググループ（UNEP Bilateral Finance Institution Climate Change Working Group）」において実施された NAMA のファイナンスに関する調査の主な結果についての紹介があった。また、途上国の開発政策の策定において NAMA を主流化することの重要性及び、採算性と持続可能性を備えた NAMA の策定のためにより一層の努力が望まれるとのコメントがあった。
- センター・フォー・クリーンエア・ポリシー（CCAP）の代表者より、15 カ国における NAMA の策定支援の実績をもとに、2013 年以降の具体的なプログラムの実施に向けたキャパシティ・ビルディングや支援の必要性を認識しているとのコメントがあった。特に、長期支援、民間投資の活用、資金ツールの構築の必要性が強調された。また、NAMA の実施を通じた先進国と途上国のパートナーシップが双方にとり、”learning by doing”の機会であると述べた。
- KfW の代表者より NAMA への資金支援の重要なクライテリアとして、途上国による野心のレベル、途上国の意思とオーナーシップ、MRV の構築、そして、NAMA のプログラムの完成度の 4 点が挙げられた。特に NAMA の内容については、具体化な活動が明確であり、採算性も求められると述べた。

2. 質疑応答

時間の都合で質疑応答なし。

3. 特記事項

途上国、先進国共に関心の高いテーマであることから、約 80 名が参加し、非常に盛況であった。NAMA の支援する先進国側と支援を受け実施する途上国側の発表者のバランスがとれている有益なセッションであった。
サイドイベント終了後に個別に話をしたブータン代表者からは、将来的な NAMA 策定にあたり日本政府の支援を期待している旨のコメントがあった。特に関心のある分野は、交通及び住宅とのこと。

5.3.11.エネルギー経済研究所（サイドイベント）

サイドイベント名	Joining efforts to support the preparation and implementation of NAMA: an international partnership
日　時	2012 年 12 月 5 日（月）15:00-16 :30
場　所	Qatar National Convention Center
主　催	エネルギー経済研究所
テーマ	「途上国の中期排出削減ポテンシャルと地球温暖化対策における日本の貢献」
目　的	途上国における排出削減活動の重要性と最先端の低炭素技術を活用した日本の貢献の可能性について、広く国際社会と共有する。
参加者	40 名程度

1. 概要

・基調講演

- サイドイベントの開催にあたり、経済産業省産業技術環境局長の鈴木秀夫氏より、日本の低炭素技術の活用により途上国の温暖化対策と経済発展の両面からの支援を目指しているとのコメントがあった。
- 外務省国際協力局気候変動課長の田村政美氏が基調講演を行い、COP17 で提唱された「東アジア低炭素成長パートナーシップ」を通じた日本の取り組みについて紹介した。世界で最も排出が多いアジア地域において、パートナーシップ参加国がサミットや会合の開催を通じ集まり、お互いの経験を共有する場を持ち、活発な意見を交わし、温暖化対策に向けた協力体制を構築することの重要性を指摘した。
- モルディブ環境大臣の Maria Schakilla 女史のスピーチでは、地域開発や再生可能エネルギー、及び環境等、日本からの様々な支援に対する謝辞が述べられた。特に自然災害への事前対策における多額の資金支援に対し感謝しているとコメントした。モルディブでは最大の太陽光発電の開発が進んでいることや、日本の日立プラントテクノロジーの技術を用いた海洋深層水の空調・海水淡水化利用等を通じた省エネプロジェクトが推進されていることが紹介された。また、BOCM については、日本の先端技術の移転を促進するスキームとして大いに期待しているとコメントがあった。
- エネルギー経済研究所理事の山下ゆかり氏が、2050 年における先進国の排出量の展望と排出削減に向けた挑戦について講演し、日本におけるエネルギーの議論が世界全体に対し大きな影響力を持つものであることを強調した。

・参加機関からの発表

- 経済産業省地球環境連携・技術室長の八山幸司氏からは、日本政府により提案されている JCM/BOCM のスキーム案の説明と、これまでに実施されている FS 調査の概要が紹介された。
- NEDO 技術開発機構京都メカニズム事業推進部長の笠井俊彦氏からは、アカデミック、産業界、公共研究機関等との連携を通じた NEDO の活動について紹介があった。NEDO が支援する JCM/BOCM FS 調査の事例では、タイ及びベトナムのグリーンコンビニエンスストア、インドネシアの炭素地中貯留、及びモルディブの海洋深層水プロジェクトが紹介された。
- JICA からは気候変動室の川村氏より、JICA による途上国支援の実績が発表され、支援の成果を図るツールとして Climate Finance Impact Tool (Climate-FIT)が運用され

ていることが紹介された。また、「二国間開発金融機関の気候変動ワーキンググループ（UNEP Bilateral Finance Institution Climate Change Working Group）」との共同で実施された NAMA のファイナンスに関する調査についても触れられた。

・パネルディスカッション

- パネルディスカッションにおいては、コメンテーターとして、インドネシア政府 NCCC の Dicky E. Hindarto コーディネーター及びケニア環境省 Stephen King'uyu 氏が、各機関からの発表者と共に登壇した。
- インドネシアの Dicky 氏からは、世界各国で、様々な新しい排出削減の仕組みが提案されている中、より良い仕組みが早急に立ち上がることが望ましいとコメントがあった。特にインドネシアにおいても、2020 年までに 40%の削減目標を掲げており、一層の努力が必要であり、新しい仕組みの活用が期待されると述べた。また、JICA や NEDO の発表内容について、いずれの技術も途上国にとっては有効なものであり、キャパシティ・ビルディングの実施と技術移転の実現を期待すると述べた。
- ケニアの Stephen 氏は、同国における適応及び緩和の重点分野を掲げたアクションプランの策定について紹介があった。アクションプランにおいては、セクター別に脆弱性を分析し、それぞれの対応策も示されている。現在のアクションプランは 2012 年末までの 5 年間を対象としており、現在、第 2 次アクションプランの策定を進めているという。JCM/BOCM の FS については、特にポテンシャルの高いプロジェクト分野においてモデル事業の実施が進むことを期待すると述べた。

2. 質疑応答

Q（ルワンダの参加者）：JICA の発表において、緩和分野のプロジェクトが多く実施されていることがわかった。適応分野については世界的にも未だ対応が十分でないと言われているが、今後どのように拡大していく予定か。

A (JICA 川村氏)：適応分野においても様々な取り組みを行っていること、特に TICAD を通じた取り組みについて紹介があった。

Q （ルワンダの参加者）：日本の技術は非常に最先端でハイレベルであり、これらの技術をコミュニティベースの小規模農業や水利用等の分野にどのように適用可能であるのか。

A (METI 八山氏)：各国ごとに希望や重点分野があることは承知しており、各国のニーズに合わせたプロジェクトや技術の選択を行っていること、これにより、高度な技術でも、コミュニティレベルのプロジェクトに採用が可能であると説明があった。

3. 特記事項

日本政府の支援に対する聴衆の関心の高さが伺えた。本サイドイベントを通じ、JCM/BOCM をはじめとした日本政府の気候変動への取り組みに対する理解がより一層深まることが期待される。

5.3.12.経済団体連合会（サイドイベント）

サイドイベント名	Japan's contribution to realize low carbon society
日　時	2012 年 12 月 5 日（月）20:15-21:45
場　所	Qatar National Convention Center
主　催	経済団体連合会、NEDO 共催
テーマ	低炭素社会づくりに向けた日本の貢献
目　的	二国間クレジットメカニズム（JCM/BOCM）等を通じた日本技術の移転により、いかに低炭素社会づくりに貢献していくかについて議論する。
参加者	150 名程度

1. 概要

- 開会挨拶を NEDO の古川理事長が行い、長浜環境大臣が、日本の地球温暖化対策への貢献につき、産業界の自主行動計画の実績や、二国間オフセット取り組みなどを引用しながら紹介した。
- 国連環境計画（UNEP）事務総長の Achim Steiner 氏が、温暖化問題、環境問題に対する日本の技術貢献への期待について述べた。
- パネルディスカッションのセッションでは、新日鉄住金の岡崎環境部上席主幹が自主行動計画、セクター協力の実績、BOCM への取り組みについて紹介、ベトナム資源環境省国際協力局次長の Pham Van Tan 氏が日本の技術支援と BOCM への期待を表明した。また、英国 Vivid Economics ディレクターの John Ward 氏がカーボンマーケットについての分析を話した後、CDM の限界、特に大型インフラ投資において CDM は本質的に不向きであり、それを補完する新制度の歓迎を表明した。
- NEDO 理事の上田氏から、NEDO の環境・エネルギー技術の開発支援の歴史、海外普及支援活動と BOCM の FS 事業が紹介された。また、技術移転の難しさなどが指摘された。
- 全体を通して Steiner 事務総長から、温暖化対策で技術の重要性と具体的な成果を出すことの重要性が指摘され、日本の技術が地球の温暖化の抑制に貢献することへの期待と共にパネルが締めくくられた。
- 終わりに経団連を代表して同地球環境部会長の進藤氏が閉会の挨拶を行った。

2.　質疑応答

特になし

3. 特記事項

経団連からの情報では、国連環境計画（UNEP）の事務総局長は、国際自然保護連合（IUCN）で代表を務めた後、2006 年から現職であり、CTCN（Climate Technology Centre and Network）のホストになっている。経団連が提言している、日本が優位性を持つ技術の TEC 技術マップへの掲載、CTCN の具体化に向けて、その関係の強化を図るために、今回のサイドイベントに招聘したとのことであった。今回の COP では、CTCN の議論が多く今後の日本の技術協力と UNEP の関係は興味深いと思われる。

5.3.13. ドイツ復興金融公庫(KfW)（サイドイベント）

サイドイベント名	National Development Banks' Approaches to Leveraging Private Sector Climate Investment
日　時	2012 年 12 月 5 日（月）20:15-21 :45
場　所	Qatar National Convention Center
主　催	ドイツ復興金融公庫(KfW)
テーマ	「民間資金を気候変動ファイナンスに動員するための国家開発銀行のアプローチ」
目　的	民間資金の気候変動プロジェクトへの動員策について、国際社会と広く知見を共有する。
参加者	20 名程度

1. 概要

- KfW の Jochen Harnisch 氏より、2011 年 9 月に発足した国際開発金融クラブ（IDFC）の取り組みについて紹介があった。
  - IDFC は、先進国のみならず、チリ、ブラジル、及び中国等の新興国を含め 19 の二国間援助機関が参加しており、民間の資金の動員が難しい長期資金の提供や高リスクの補填等において積極的な役割を果たしている。
  - IDFC のグリーンファイナンス報告書によると、2011 年において参加 19 機関によるグリーンファイナンスへのコミット金額は 890 億ドルにのぼり、このうち 83%が再生可能エネルギーや温室効果ガス削減プロジェクトに供与された。

- Climate Policy Initiative の Tom Heller 氏からは、2012 年 12 月 3 日に発表された Global Landscape of Climate Finance 2012 の主なポイントについて解説があった。
  - 世界全体において 2010/2011 中に動員された気候変動ファイナンスは 3,640 億ドルにのぼり、このうち 2,170～2,430 億ドルが先進国の民間企業や独立発電事業のディベロッパー等からの資金であった。公的資金は 160～230 億ドル程度であり、殆どは、インセンティブメカニズムや補助金などによる初期投資の軽減等を通じ、民間投資の触媒機能を果たした。
  - 国家開発銀行や商業銀行の資金も 1,100～1,200 億ドルが動員された。気候変動に対し膨大な資金が投入されていることは十分に確認されたものの、IEA の最新の報告によると、気温の上昇を 2 度以内に抑えるために必要な資金は十分ではなく、電力セクターのみでも毎年 1 兆ドルが必要とも言われている。
  - 世界全体として、どの分野にどれだけの支援が必要であるかを正確に把握するためにも、CPI が行っている気候資金のマッピング作業の継続が重要と考える。民間投資の推進が最も成功している例はドイツであり、低炭素経済への転換に向けた取り組みの 95%が民間資金により推進されている。2012 年末に発表予定の報告書「The Landscape of Climate Finance in Germany」において詳細な分析が示されている。
  - 民間資金の活用にあたっては、従来の「プレーンバニラ型金融」も含め、多様な手法を検討し、個々の途上国に最も適当なスキームを採用することが望ましい。

- WRI CEO の Andrew Steer 氏は、気候変動は全てのセクターに関わる問題であり、全

世界で必要とされる緩和や適応策を全世界的に推進していくには莫大なコストがかかり、技術途上国の政策に関わる多大なリスクが伴うと述べた。また、こうした状況において気候ファイナンスに民間資金を呼び込むためには、柔軟性のあるファイナンススキームの構築が不可欠であると強調した。世界銀行の気候投資基金（CIF）は、エクイティ投資や政策サポート等様々な機会を提供したが、柔軟性と即効性に欠けており、この点は緑の気候基金（GCF）への教訓になることを期待すると述べた。また、これまでに実行された気候ファイナンスの成功例として、クリーン・テクノロジー基金(CTF)が支援したモロッコの世界最大規模の太陽光発電事業を挙げた。同事業では 2020 年までに 2000MW を太陽光発電で賄うものである。

- Allianz Climate Solutions の Kasten 氏は、クリーンエネルギー分野への投資促進をするために、以下の 4 点が重要と述べた。

- 低炭素社会への転換（NAMA の推進）のための包括的な法律・規制の整備
- プロジェクトリスク及び投資リスク分担のメカニズムの構築
- 機関投資家にとり魅力のある投資オプション（例：投資適格気候債等）を緑の気候基金に設置する。
- リスクとリターンのバランス

2. 質疑応答

聴講せず。

3. 特記事項

サイドイベントの開始が夕刻遅かったこともあり、参加人数は少なかったが、ハイレベルなパネリストによる有益なセッションとなった。

写真 13.　COP18 全体会合

写真 14. COP18 議長のカタールの Al-Attiyah 氏

写真 15.　エネルギー研究所サイドイベントにおけるパネルディスカッション

写真 16. NAMA への取り組みについて講演するHaベトナム環境省国際協力局長 (右から 3 人目)

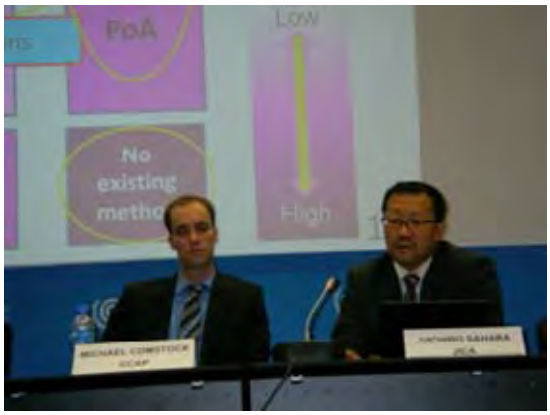

写真 17. JICA の気候変動への取り組みについて紹介する佐原副室長(右)

写真 18. 赤十字赤新月社連盟気候センターサイドイベントで議論するパネリスト達

6. まとめ

6.1. 島嶼国による低炭素開発戦略の策定と実施に向けて

低炭素開発戦略（Low Emission Development Strategy; LEDS）、途上国における適切な緩和行動(NAMA)や国別適応計画(NAPs）の成功の鍵は、策定された戦略がいかに効果的に遂行されるかにかかっている。このため、低炭素開発戦略は、国家の開発計画等に組み込まれたものであり、途上国がオーナーシップを持って推進されることが重要である。

島嶼国においては、すでに国家気候変動政策や国別適応計画(NAPs）等の策定を進めている国が多数あり、クック諸島は、島嶼国で初めて、2013 年 1 月 17 日に再生可能エネルギーに関する NAMA を国連に提出した。これは、2020 年までに 100%の電力を再生可能エネルギーで創出しようとするものである。

このように、島嶼国独自の取り組みが進められてはいるが、策定された政策の推進に必要な資金や、実施能力が十分に備わっていないのが現状である。

政策対話のフォローアップとして COP18 において面談したソロモン諸島の担当者からは、2012 年 6 月に同国が初めて策定した国家気候変動政策について、同文書で取りまとめられた気候変動の課題を具体的な対策やプロジェクトとしてして実施していくための道のりは長く、現状では、資金もキャパシティも不足していることを示唆する声が聞かれた。

こうした状況の中、JICA には、国ごとの政策対話の実施を通じ、気候変動対策の具体的な政策アクションの設定、アクションの実施、実施状況のモニタリングまでの包括的な支援の供与を通じ、島嶼国の気候変動対策の実現に寄与することが望まれる。

政策対話の議論においては、島嶼国全体が直面している最も重要な課題として、近年見られる異常気象の頻発や海面上昇などの気候変動の影響や、それに伴う自然災害へのリスク管理と対応能力の強化が挙げられている。

特に、JICA は、防災・災害対策の分野では、世界各地での支援実績を多数有し、気候変動の包括的な支援においても、ベトナムやインドネシア政府への支援経験があることから、これらの知見が島嶼国の適応策にも生かされることが期待される。

また、緩和策では、国連でも課題とされているが、島嶼国においては、後発途上国(LDC)と共に、クリーン開発メカニズム(CDM)の便益が殆どもたらされていない状況がある。2012 年春に、CDM登録件数が 10 件以下の国を対象とした国連の融資制度[3]が立ち上げられたが、現在までにこの適用を受けた島嶼国はベリーズ 1 カ国のみである。

今般の COP18 において第二約束期間が設定されたことは大きく評価される点であるが、日本をはじめとする第一約束期間の主要プレーヤーが不参加を表明した第二約束期間において、島嶼国自身が CDM プロジェクトを推進していくことは、これまで以上に困難になると考えられる。

[3] http://cdmloanscheme.org/

日本政府が参加しない第二約束期間において、JICA による CDM の支援が可能かは明確ではないが、CDM の実施体制整備や CDM 化のキャパシティ・ビルディング、炭素クレジット(CER)の購入等、可能なスキームでの島嶼国への支援供与が期待される。

6.2. 次年度事業への提言

低炭素開発戦略に関する調査は、平成 23 年度実施の「アフリカ地域低炭素開発戦略情報収集・確認調査」に次いで二回目となる。

政策対話の実施に関しては、気候変動に関わる日本の関係省庁と、途上国の気候変動政策担当が一同に介する、またとない貴重な機会であることを評価する声が、多くの参加者から聞かれた。また、このような機会を定期的に実施することを望む声も聞かれた。

また、政策対話を通じ、日本政府の気候変動に対する姿勢を理解し、率直な意見交換を行う場が持たれたことや、日本国内の民間企業や有識者、国際機関の参加を得て、日本の気候変動問題に対する取り組みや支援について学ぶことが出来たことも評価された。

さらに、政策対話終了後に実施した視察プログラムについても、将来的に、自国への適用可能性が高い日本の先進的な環境技術を間近で見ることが出来き、非常に有益であったとの声が聞かれた。

参加者からの評価はもとより、このような政策対話の実施は、日本政府にとっても、COP 等の気候変動交渉の主な論点や目指すべき成果及び協力関係について、参加各国と個別に議論を交わす重要な機会である。このことから、次年度以降においても、類似の活動が継続され、世界全体の気候変動への取り組みの一助となることが期待される。

7. COP18 収集資料

COP18 において収集した資料のウェブサイトリンクを下記にまとめる。

7.1.COP18 における交渉全般

- 国連気候変動枠組条約 - *DOHA 2012*
http://www.cop18.qa/

- IISD - *Doha Climate Change Conference - November 2012 - Negotiations*
http://www.iisd.ca/climate/cop18/enb/

- IISD - *Doha Climate Change Conference - November 2012 - Side Events*
http://www.iisd.ca/climate/cop18/enbots/

- Climate Action Network News - ECO
http://www.eco.climatenetwork.org

- Third World Network - Doha News Update
http://www.twnside.org.sg/title2/climate/doha.news01.htm

- Christian Aid - Time for Climate Justice 9: Doha Climate Talks, A Better Way Forward
http://www.christianaid.org.uk/actnow/climate-justice/index.aspx

- 地球産業文化研究所 - COP/SB に関する情報
http://www.gispri.or.jp/kankyo/unfccc/copinfo.html

- 地球環境戦略研究機関（IGES）- *国連気候変動会議*
http://www.iges.or.jp/jp/news/topic/1211_cop18.html

7.2.その他

- Climate Policy Intitiative - *Global Landscape of Climate Finance 2012*
http://climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2012/

- EBRD - *Sustainable Energy Initiative (SEI)*
http://www.ebrd.com/pages/sector/energyefficiency/sei/renewable.shtml

- C3D - Capacity Development for Adaptation to Climate Change & GHG Mitigation in Non-Annex I Countries (C3D+)
http://www.c3d-unitar.org/

- Center for European Policy Studies - The Future of the Clean Development Mechanism
http://www.ceps.eu/ceps/dld/7473/pdf

- Center for European Policy Studies - *A Framework for Various Approaches under the UNFCCC*
http://www.ceps.eu/ceps/dld/7470/pdf

- Nordic Environmental Finance Corporation - *Climate Finaance and Funds*
http://www.nefco.org/financing/carbon_finance_and_funds

- EBRD - *Sustainable Energy Initiative (SEI)*
http://www.ebrd.com/pages/sector/energyefficiency/sei/renewable.shtml

- International Renewable Energy Agency - *Handbook on Renewable Energy Nationally Appropriate Mitigation Actions (NAMA) for Policy Makers and Project Developers*
http://www.irena.org/DocumentDownloads/Publications/Handbook_RE_NAMAs.pdf

- The Institute of Energy Economics, Japan - Asia/World Energy Outlook 2012
Summary, http://eneken.ieej.or.jp/data/4683_summary.pdf
Report, http://eneken.ieej.or.jp/data/4683.pdf
Presentation material, http://eneken.ieej.or.jp/data/4684.pdf
Annex, http://eneken.ieej.or.jp/data/4686.pdf

- European Commission - *Reaping the benefits of Climate Action*
http://ec.europa.eu/enterprise/policies/industrial-competitiveness/competitiveness-analysis/european-competitiveness-report/files/ecr2012presentation_en.pdf

- CDM Policy Dialogue, *CLIMATE CHANGE, CARBON MARKETS AND THE CDM: A CALL TO ACTION Report of the High-Level Panel on the CDM*
http://www.cdmpolicydialogue.org/report/rpt110912.pdf

- European Union - *European Union fast start funding for developing countries. 2010-2012 Report*
http://ec.europa.eu/clima/policies/finance/international/faststart/docs/fast_start_2012_en.pdf

- US Treasury - Meeting the Fast Start Commitment
http://www.state.gov/documents/organization/201130.pdf

- UNEP - Financing renewable energy in developing countries
http://www.unepfi.org/fileadmin/documents/Financing_Renewable_Energy_in_subSaharan_Africa.pdf